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COUNTY MIDDLESEX AUG. 1958

THE
ONTARIO WATER RESOURCES COMMISSION

REPORT ON

Pollution Survey

COUNTY of MIDDLESEX

REGISTERED PROFESSIONAL ENGINEER
CIVIL
P. G. COCKBURN
PROVINCE OF ONTARIO

BY

THE COMMISSION

DATE

AUGUST 1958

PARLIAMENT BUILDINGS - TORONTO

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WATER RESOURCES SURVEY

County of Middlesex

August 1958

A survey of water resources
and stream pollution with
recommended programs

Part 2 - Water Pollution

The Ontario Water Resources Commission

Parliament Buildings - Toronto

WATER RESOURCES SURVEY

- County of Middlesex -

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Part 2 - Water Pollution

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Interpretation of Analyses

For convenience in the interpretation of laboratory analyses it may be taken as an objective that pollution in streams should not exceed the following figures --

B.O.D. (Biological Oxygen Demand) 4 ppm. (parts per million)
S.S. (Suspended Solids) 15 ppm.
Coliform Counts (M.P.N. - Most Probable Number) 2400

Similarly the effluents from drains or sewage plants should have, as objectives, figures not in excess of the following --

B.O.D. 15 ppm.
S.S. 15 ppm.

WATER POLLUTION SURVEY

- County of Middlesex -

INTRODUCTION

Part 2

The survey of Water Resources in Middlesex County is divided into two parts. The first part deals with water supplies for all municipalities in the County. This report was published in August 1958. The present part II of this investigation deals with the pollution of water supplies.

The relationship between usable water supplies and stream pollution will be apparent. Water supplies, both surface and underground should be available for repeated use. This can be possible only when pollution is kept under strict control. Watercourses are expected to serve many purposes. This is particularly so for an area so diversified and so promising for the future as the County of Middlesex and adjacent territory. These stream uses range all the way from carrying away treated wastes to withdrawal of domestic and industrial water supplies either directly from the surface or indirectly from underground.

There is a two-fold responsibility in the control of stream pollution. The County must protect these waters to ensure that their use within its boundaries will not be adversely affected. There is the additional obligation as a good-neighbour to safeguard the rights of down stream riparian users. A biologically unbalanced stream can carry these adverse effects many miles to result in an inferior water supply for the use of others and for curtailment of aquatic life. Every community on a moving river needs to play its part effectively in the overall program of maximum cleanliness with the best uses of water for all.

A. E. Berry
General Manager.

A. M. Snider
Chairman.

WATER POLLUTION SURVEY

- County of Middlesex -

Chapter 1

SUMMARY AND RECOMMENDATIONS

SUMMARY

This report is based on a detailed study of water pollution in the County of Middlesex made by the Ontario Water Resources Commission in the first part of 1958. The investigation was conducted on a municipal basis but with particular reference to the three main watersheds in the county, the Thames, the Sydenham and the Ausable. All drainage falls within these three basins, and as a result any pollution, either continuously or intermittently, can be expected to reach these rivers, unless purified or absorbed on the way.

The findings of this survey may be summarized as follows:

1 - The degree of pollution in the streams varies considerably throughout the county, chiefly being associated with the urbanized areas. The effects of pollution also vary with the season of the year, and these are particularly intensified during the warm weather, and dry periods when the flows in the streams are low.

2 - The Thames is the most affected of the three main rivers, especially in the London area. Above London, the north and south branches of the river are relatively free from fresh pollution throughout that border area. However, sanitary and industrial contaminants are discharged into the river from many and diversified outlets in London, London Township and Westminster Township. Below the urban London

area the river is in a state of recovery, which condition extends some 10 miles downstream.

3 - Strathroy on the Sydenham River has a sewage treatment plant, but the results of tests on the effluent have shown that this has not been sufficient to meet recognized standards. This inadequate treatment together with separate industrial waste discharges, creates adverse conditions which extend some distance downstream.

4 - The Town of Parkhill discharges sanitary and industrial wastes through surface water drains to pollute the receiving watercourses which form part of the Parkhill Creek Watershed,

5 - All five villages in the county have inadequate private sewage disposal systems of the septic tank type which result in discharges of partially or untreated wastes to storm drains and ditches.

The abatement and continuous control of stream pollution is an urgent problem in this county. It is a responsibility of all people and of all agencies concerned with or interested in the maintenance of water resources and the protection of health, Polluted water is not usable for the many purposes for which it was intended. Its value as an essential natural resource is accordingly lost. These streams can and should be valuable assets to the people of the County. They can be restored to satisfactory quality, but only if aggressive action is taken to control all sources of pollution. This involves public sewage treatment works, industrial wastes, storm drainage and private sewage disposal systems.

RECOMMENDATIONS

The conclusions and recommendations based on this survey of water pollution in the County of Middlesex are as follows:

1 - City of London

The programme for pollution control for the City of London involves action on sewage works and all sewer outfalls.

(A) Sewage Treatment Plants:

1 - The South End Sewage Treatment Plant be abandoned, and the flow be diverted to either of the two existing sewage treatment plants.

2 - The original section of the East End plant built in 1916 to treat a flow of 1 Million Gallons per day be dismantled, and the total flow be treated in the modern activated sludge section of these works.

3 - A program of sewage treatment improvements be undertaken for both the East End and West End works as follows:

East End Plant

(a) Chlorine contact chambers be constructed.

(b) Sludge storage facilities be provided and the full capacities of the aeration tanks be utilized for biological treatment.

(c) The original Imhoff section of this plant be dismantled.

(d) Alterations be made to the influent channel and to the storm water clarifier.

(e) Effective sludge treatment and disposal be adopted.

West End Plant

(a) Chlorine contact chambers be constructed.

(b) Sludge storage facilities be provided and the full capacities of the aeration tanks be utilized for biological treatment.

(c) Replacement and repair be made to the aeration piping, water wheels, clarifier and miscellaneous devices.

(d) Effective sludge treatment and disposal be adopted.

4. The provision in advance of actual need of adequate capacities in all sewage treatment plants, and the operation of these works be such as to secure maximum efficiency in purification at all times,

(B) Sewer Outlets:

1 - A planned program of industrial waste supervision be undertaken with the requirement of pre-treatment at the industries before discharging wastes to sewers in accordance with the city by-law on sewage and drainage work.

2 - Storm sewer flows be controlled to meet OWRC objectives for a clean stream either by separation of storm water from all wastes, or by treatment of combined overflows to an acceptable point.

3 - The combined sewer system be so constructed as to have capacity to treat the flow of three times the dry weather flow.

(4) A policy of separate sewers be adopted as far as feasible for future construction.

(C) Thames River:

Minimum flows be maintained in the Thames River consistent with capacities and efficiencies of the sewage treatment plants which will result in coliform organisms not in excess of 2,400 per 100 ml. and an upper limit for B.O.D. (Biochemical Oxygen Demand) of 4 p.p.m. and in general a clean, attractive watercourse.

2. London Township

1 - The second and third sewage treatment plants proposed to serve the north end and west end populated areas of the township be constructed as early as possible.

2 - A planned program of industrial waste supervision be implemented including a Sewer Ordinance By-law for controlling wastes discharged to sewers and the elimination of all waste discharges direct to watercourses.

3 - Strict control of all septic tank installations in the township be maintained along with the elimination of all sanitary waste discharges from private dwellings, and including laundry wastes, which may carry pollution to storm sewers or surface drains.

3. Westminster Township

1 - Sewage works be initiated for the Police Village of Byron and other areas of development in the township.

2 - Adequate control of sanitary waste discharges be implemented by strict enforcement of requirements for septic tank systems in the unsewered areas.

Particular attention is needed in the built-up areas of Lambeth and that part of the township bordering south London.

4. Town of Parkhill

1 - An extensive sanitary survey of Parkhill be carried out by municipal officials to eliminate, as far as possible, all sanitary connections to the drainage system.

2 - Consideration be given to the construction of a municipal sewage works system.

3 - Further dumping of refuse be directed away from Parkhill Creek.

4 - Officials of the Parkhill Creamery take corrective measures to prevent the pollution of local watercourses by the discharge of untreated wastes.

5. Town of Strathroy

1 - The operation of the sewage treatment plant be improved to meet OWRC effluent standards of 15 parts per million of B.O.D. and suspended solids.

2 - Standards of 4 parts per million of B.O.D. and 2,400 coliform organisms per 100 ml. be maintained in the Sydenham River throughout and below the town.

3 - Industrial wastes be given complete treatment before being discharged to the river.

4 - Contamination of storm sewer flows be controlled to meet OWRC objectives for a clean stream.

6. The Villages of Ailsa Craig, Glencoe, Lucan, Newbury and Wardsville

Surveys be conducted by municipal officials to locate and eliminate all connections to surface water drains which in any way may contribute to pollution.

Consideration be given by the officials of the Villages of Glencoe and Lucan, to alternative methods for sewage disposal, by initiating public sewage works.

7. Township Areas

Care be exercised at all times over septic tank systems, and all sources of stream pollution.

WATER POLLUTION SURVEY

- County of Middlesex -

Chapter 2

In this water pollution survey each municipality is considered separately in the designated sections of the report. All aspects of pollution are reviewed and recommendations made with regard to corrective measures which should be undertaken. The City of London is considered first. Then the towns, villages, Police villages and townships are dealt with in that order. The locations of these in relation to the County are shown in Figure 1.

CITY OF LONDON

It was necessary, in undertaking a Water Resources Survey of Middlesex County to study the effects of pollution on the streams receiving the discharges from surface runoff, industrial wastes, sewage treatment plants, and any other flows which became part of the water in the creeks and rivers. An intensive investigation was made of the Thames River with particular attention being given to that section of the river in the greater London area. The results of this examination are tabulated and discussed in the report together with recommendations on procedures to be followed to comply with the requirements on pollution control as envisaged under The Ontario Water Resources Commission Act.

The survey reveals the efficiences and defects of the three sewage treatment plants operated by the City of London and the effects these effluents are having upon the Thames River. Samples of these different effluents and the discharges through sewer outlets at the river were taken. These, with

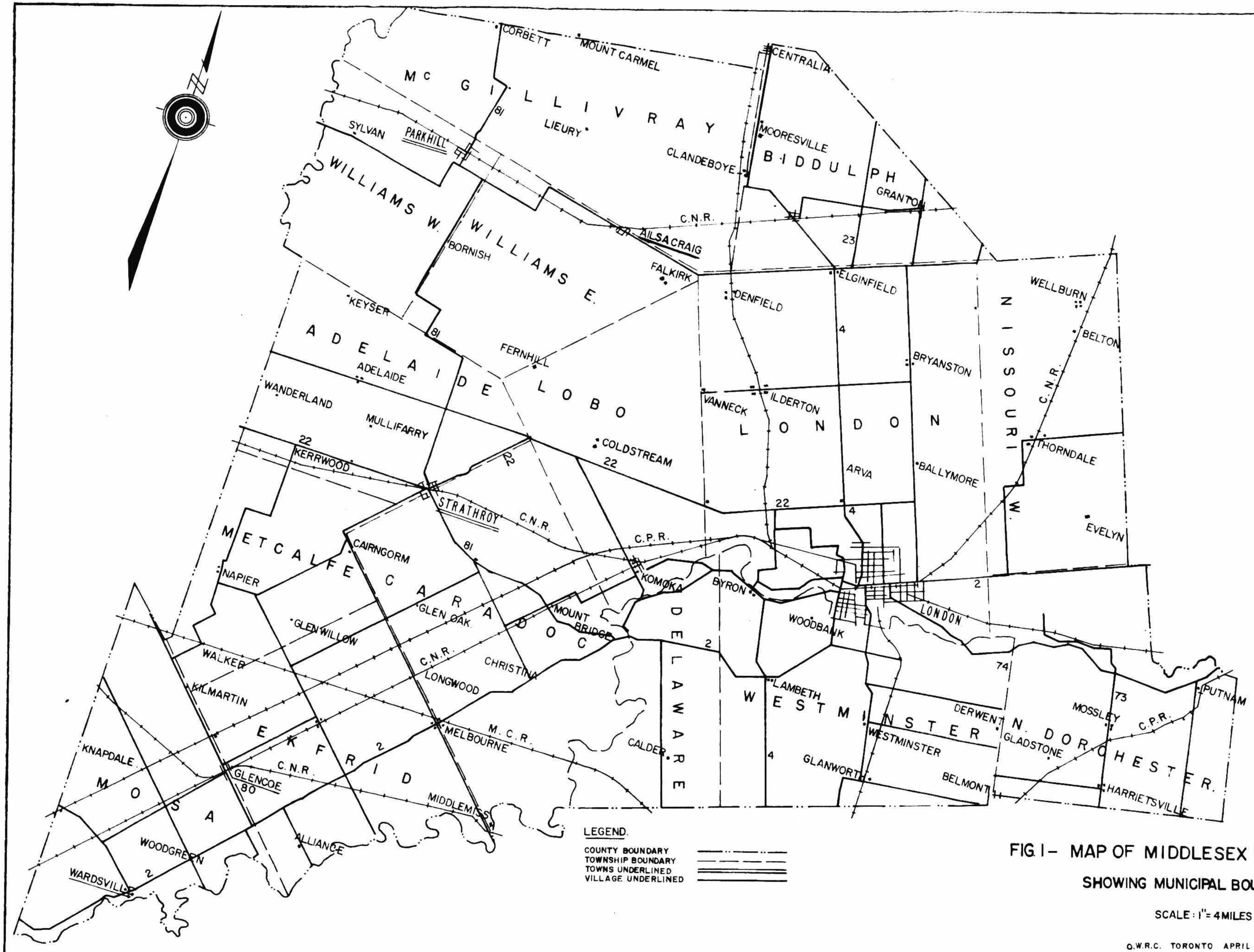


FIG. I – MAP OF MIDDLESEX COUNTY

SHOWING MUNICIPAL BOUNDARIES

SCALE: 1" = 4 MILES

O.W.R.C. TORONTO APRIL 1958 S.H.

stream analyses make it possible to interpret the situation as it exists now, as well as to indicate the changes which should be made to ensure that this river below London as well as throughout the City will be in satisfactory condition.

It is recognized that the City has been carrying on a sewage treatment program for some time, and that a good deal has been accomplished. It is also true that the results obtained through these treatment works indicate a need for considerable improvement and additions. It is therefore timely here to review the existing situation in the London area, and to comment on the program needed to ensure pollution abatement in this watercourse.

THAMES RIVER POLLUTION SURVEY

In interpreting the condition of the river, particular reference is made to the survey during the month of May, 1958, although the results over a longer period of time are also kept in mind. Samples were obtained on two consecutive weeks commencing May 20, 1958. Reference is made to the sampling points and analyses of samples shown in figures 2 and table 1. The branches of the Thames River upstream from London are generally of good quality. The south branch receives the effluents from sewage treatment works at Woodstock, Ingersoll and London Township. These, however, are all modern sewage treatment plants, and results show that they are operating at a high degree of efficiency.

In general, it may be said that the south branch of the Thames River above London appeared to be in good condition. As the river passed through London its quality depreciated considerably. The same comment may be made about the north branch. The south branch showed high coliform contamination as well as excessive B.O.D. figures. When these two branches join into the main stream below London it is natural for the contamination to show up markedly. As an illustration of this the bacterial results of the May survey are noted as follows: a sample collected from the First Street bridge in the south branch showed a coliform count of greater than 15,000 per 100 ml. and a B.O.D. of 160 p.p.m. At Springbank dam and Byron the coliform counts exceeded 150,000 per 100 ml. with B.O.D.'s of 12 p.p.m. These figures may be compared with the objective set by the Ontario Water Resources Commission for a clean stream of 2,400 coliform organisms per 100 ml. The upper limit for the B.O.D. (Biochemical Oxygen Demand) should be regarded as 4 p.p.m. All of these samples showed figures well in excess of this.

TABLE I - COUNTY OF MIDDLESEX

THAMES RIVER SURVEY ANALYSES

SAMPLING POINTS	MILEAGE	LOCATION	B.O.D. (P.P.M.)	SOLIDS TOTAL	SOLIDS SUSP. (P.P.M.)	SOLIDS DISS.	MEMBRANE FILTER COLIFORM COUNT PER 100 ML. (MPN)
T.56.7	56.7	WARDSVILLE BRIDGE	6.0	396	74	322	140
			49	422	52	370	1,700
T.68.8	68.8	WALKER'S BRIDGE	6.4	412	62	350	40
			6.9	520	164	356	25,000
T.69.6	69.6	JUST BELOW JUNCTION NEWBIGGEN CR. FROM GLENCOE	3.4	538	284	254	150
			7.1	426	64	362	63,000
T.G.73.0	73.0	NEWBIGGEN CR.,HWY.#2	7.4	558	134	424	18
			7.6	746	308	438	74,000
T.Y.85.9	85.9	GENTLEMEN CR.ON HWY. #2	6.0	656	216	440	15,000+
T.87.5	87.5	BRIDGE SOUTH OF MELBOURNE	8.2	434	42	392	140
			9.5	440	36	404	2,300
T.110.7	110.7	DELAWARE BRIDGE HWY. #2	8.0	358	28	330	LESS THAN 10
			6.9	472	16	356	48,000
T.111.3	111.3	JUST BELOW JUNCTION DINGMAN CR. FROM LAMBETH	2.0	356	50	306	120
			8.0	482	48	434	150,000
T.D.122.5	122.5	DINGMAN CR. BRIDGE HWY. #2 JUST WEST OF LAMBETH	2.4	400	20	380	50
			1.6	550	20	530	22,00
T.D.123.6	123.6	DINGMAN CR.AT BRIDGE HWY.#4 SOUTH OF LAMBETH	2.9	402	50	352	620
			10	486	36	450	1,300
T.D.126.9	126.9	DINGMAN CR. AT WHITE OAK	20	424	64	360	52,000

SAMPLING POINTS	MILEAGE	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM.)	SOLIDS DISS.	MEMBRANE FILTER COLIFORM COUNT PER 00 ML. (MPN)
	112.8	JUST BELOW JUNCTION CREEK NORTH FROM KOMOKA	1.0	394	10	384	--
			3.6	434	26	403	2,100
T.114.8	114.8	BRIDGE SOUTH-EAST OF KOMOKA	10.0	334	22	312	4,100
			3.8	380	12	368	9,600
T.118.0	118.0	JUNCTION SPRINGERS CREEK AT KILWORTH BRIDGE IN LOBO	3.0	416	16	400	3,100
			5.2	400	14	386	2,900
T.123	123.0	AT BYRON BRIDGE	12.0	338	30	308	3,000
			6.5	426	16	410	GREATER THAN 150,000
T.123.5	123.5	AT SPRINGBANK DAM BELOW WOODLAND CEMETERY	12.2	368	30	338	920
			6.0	436	42	394	GREATER THAN 150,000
T.124.8	124.8	AT BRIDGE BELOW WOODLAND CEMETERY	7.6	290	6	284	150
			12	440	18	422	GREATER THAN 150,000
T.125.0	125.0	AT RIVER RD. PUMPING STATION	12	428	64	364	18,600
			2.5	436	14	422	GREATER THAN 150,000
T.126.3	126.3	ABOVE LONDON WEST END S.T.P. OUTFALL	7.6	298	10	288	1,500
			5.0	402	32	370	150,000
T.127.3	127.3	HWY. #2 BRIDGE - WHARNCLIFFE RD. LONDON	4.6	326	22	304	570
			2.4	344	14	330	54,000
T.127.5	127.5	JUST BELOW JUNCTION WITH NORTH BRANCH	4.4	282	40	242	1,085
			45	922	570	352	95,000
T.127.6	127.6	FIRST BRIDGE ABOVE JUNCTION WITH NORTH BRANCH	160	476	10	466	GREATER THAN 15,000
			76	600	36	564	GREATER THAN 150,000
T.130.5	130.5	FIRST BRIDGE BELOW EAST END S.T.P. OUTFALL	25	412	10	402	4,800
			3.4	484	54	430	3,080

SAMPLING POINTS	MILEAGE	LOCATION	B.O.D. (PPM)	SOLIDS			MEMBRANE FILTER COLIFORM COUNT PER 100 ML. (MFN)
				TOTAL	SUSP. (PPM)	DISS.	
T.131.7	131.7	AT MEADOW-LILLY ST.	5.8	402	18	384	300
			3.1	436	14	422	1,700
T.132.3	132.3	JUST BELOW JUNCTION WITH POTTERSBURG CREEK	2.4	392			810
T.133.6	133.6	BRIDGE 1½ MI. WEST OF NILESTOWN	4.0	406	12	394	200
			3.8	416	22	394	19,000
T.136.3	136.3	NILESTOWN CREEK ON HAMILTON RD WEST ENTRANCE TO VILLAGE	7.0	370	16	354	150,000 +
T.135.0	135.0	JUST BELOW JUNCTION WITH WAUBUNO CREEK	2.0	290	2	288	330
			0.6	320	24	296	3,700
T.138.8	138.8	AT DORCHESTER BRIDGE	3.6	442	26	416	43,000
			6.5	948	524	424	49,000
T.141.3	141.3	AT BRIDGE HWY.#73	3.5	468	22	446	270
T.145.2	145.2	JUST BELOW JUNCTION WITH MIDDLE BRANCH	7.0	372	40	332	4,700
			NORTH THAMES				
T.N.128.0	128.0	JUST ABOVE JUNCTION OF THAMES RIVER	1.8	222	2	220	550
			1.8	346	48	298	1,400
T.N.129.8	129.8	AT BRIDGE TO WESTERN UNIVERSITY	3.4	266	40	226	16
			2.1	286	30	256	30
T.N.130.0	130.0	JUST BELOW JUNCTION MEDWAY CR.	2.0	270	78	192	176
			7.2	280	24	256	GREATER THAN 15,000
T.N.130.5	130.5	MEDWAY CR. AT ROAD BETWEEN 3RD & 4TH CONC. GOLF COURSE	9.2	264	4	260	GREATER THAN 300
			6.4	550	20	530	8,000
T.M.D. 135.8	135.8	MEDWAY CR. - 200 YDS. BELOW ARVA	3.2	302	50	252	5,500
T.M.D. 137.5	137.5	MEDWAY CR. - 200 YDS. ABOVE ARVA	5.2	272	16	256	200

SAMPLING POINTS	MILEAGE	LOCATION	B.O.D. (PPM.)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	MEMBRANE FILTER COLIFORM COUNT PER 100 ML. (MPN)
T.M.D. 142.0	142.0	MEDWAY CR. - AT HWY.#4 SOUTH OF BIRR	1.6	282	8	274	8,600
T.N.130.3	130.3	NORTH THAMES AT HWY.#4	1.9	230	8	222	8
			1.8	282	2	280	110
T.N.131.8	131.8	AT JUNCTION WITH CREEK FROM NORTH	2.2	282	14	268	54
			2.6	310	43	262	110
T.N.136.5	136.5	AT LAKE ABOVE FANSHAWE DAM	0.3	1138	880	258	30
			2.6	294	14	270	375
T.N.137.8	137.8	AT JUNCTION WITH WYE CREEK FROM THORNDALE	4.6	270	22	248	2
			5.4	308	4	304	40
T.W.139.0	139.0	WYE CREEK AT CONC. RD. NISSOURI TWP.	1.7	304	4	300	198
			1.6	284	6	278	500
T.W.141.5	141.5	WYE CREEK AT BRIDGE-WEST ENTRANCE TO THORNDALE	2.4	202	2	200	26
			4.8	254	10	244	1,860
		WYE CREEK THORNDALE EFFLUENTS	SEE REPORT ON WEST NISSOURI TOWNSHIP				
T.W.142.6	142.6	WYE CREEK AT BRIDGE 1 MI. NORTH-EAST OF THORNDALE	1.5	258	4	254	298
			6.0	294	18	276	600
T.N.142.3	142.3	N.THAMES AT BRIDGE SIDE ROAD TO THORNDALE	1.1	214	66	148	6
			1.1	250	10	240	28
T.N.146.5	146.5	AT POPLAR MILLS BRIDGE	1.2	208	2	206	12
			2.0	310	8	302	1,050

TABLE V - POTTERSBURG CREEK

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS			MEMBRANE FILTER COLIFORM COUNT PER 100 ML. (MPN)
			TOTAL	SUSP. (PPM)	DISS.	
T.P.1	ABOVE SOMERVILLE SEWAGE TREATMENT PLANT	1.4	404	--	--	--
T.P.2	BELOW SOMERVILLE CO., SEWAGE TREATMENT PLANT	1.6	422	--	--	GREATER THAN 15,000
T.P.3	ABOVE DEPARTMENT OF TRANSPORT SEWAGE TREATMENT PLANT	14	368	--	--	GREATER THAN 150,000
T.P.4	BELOW DEPARTMENT OF TRANSPORT SEWAGE TREATMENT PLANT	18	398	--	--	GREATER THAN 150,000
T.P.5	ABOVE GENERAL MOTORS DIESEL PLANT	4.0	374	--	--	920
T.P.6	BELOW GENERAL MOTORS PLANT	5.4	384	--	--	2,300
T.P.7	THIRD ST. BRIDGE	4.7	394	--	--	8,800
T.P.8	SECOND ST. BRIDGE	3.6	380	--	--	6,300
T.P.9	FIRST ST. BELOW COLEMAN PLANT	3.5	422	--	--	14,100
T.P.10	BRYDGES STREET	4.0	400	--	--	--
T.P.11	HAMILTON RD. BRIDGE	2.9	366	--	--	1,560
T.P.12	JUNCTION - SOUTH BRANCH OF THAMES RIVER	2.4	392	--	--	810
	CARLING CREEK					**M.P.N.**
L.C.1	DUNDAS & EVA STS.	80	1286	--	--	0
L.C.2	MAITLAND ST., AND C.P.R. TRACKS	6.4	936	--	--	24,000
L.C.3	RICHMOND ST. & C.P.R. STATION	0.4	556	--	--	0
L.C.4	AT TANNERY	21	598	--	--	0
L.C.5	BELOW TANNERY	3	588	--	--	0
	EGERTON CREEK					**MEMBRANE FILTER COLIFORM COUNT PER 100 ML**
L.E.1	NORTH-EAST OF MORNINGTON AVE.	1.4	394	--	--	580
L.E.2	EGERTON & YORK STS. (AT MANHOLE)	42	738	--	--	4,600
L.E.3	OUTLET AT THAMES R.	60	686	--	--	GREATER THAN 150,000

Sampling Stations for Biological Surveys

The following sampling points for the biological survey coincide with the positions of chemical and bacteriological sampling stations.

North Branch of Thames

1. Bridge at Poplar Mills side road.
2. University bridge (Western University).
3. North branch at junction of Thames River.

South Branch of Thames

4. Bridge 1 and ½ miles west of Nilestown.
5. Egerton Street bridge near east end S.T.P.

Thames River

6. Wharncliffe Road bridge (Highway #2).
7. Woodland Cemetery.
8. Byron bridge.
9. Thames River bridge south east of Komoka.

Sampling Procedure

At each station the river bottom was examined in order to collect all the various forms of microscopic invertebrates living in the stream. Approximately 1 hour was required in collecting this quantitative sample of the fauna to ensure representative results. In addition to bottom sampling, the dissolved oxygen content at each sample point was determined and general observations were made on the nature and appearance of the stream.

Findings of Biological Surveys

The first sample on the north branch of the Thames River was taken at the bridge on Poplar Mills side road which is some distance above the City of London. Here a considerable variety of invertebrates were found including a number of forms that are sensitive to pollution. At this station mayflies were plentiful and five genera were identified. In addition to these, species of stoneflies, caddisflies, beetles and crustaceans were found. Plant growth, probably cladophora, was abundant at this point, and fish and crayfish were common. Some of the fish had constructed nests and were spawning at that time.

At the university bridge a reduction in the variety of mayflies was noted which would indicate a less favourable habitat. However, the number of individuals of these genera would indicate that no serious pollution had occurred at this station. Other forms present would confirm this observation, but again their variety was more limited than at the upper station.

The north branch of the Thames above the junction was found to contain a very sparse population. The mayflies were limited to only two genera, and only five individuals of these were collected. Other forms of invertebrates were also limited in both variety and numbers. The sparse population observed indicates that at some recent time unfavourable conditions had reduced indigenous populations.

The two stations sampled on the south branch showed good populations and a good variety of bottom fauna. At both stations the mayflies, which may be considered as being fairly sensitive were represented by three or four genera with a number of individuals being collected at each point. The river had a generally clean appearance with some but not an excessive growth of algae. The dissolved oxygen concentrations in both samples were found to be at or near saturation.

The main stream of the Thames River below the junction of the north and south branches was sampled first at the Wharncliffe Bridge. At this point the bottom fauna indicate that no serious damage had occurred as a result of pollution. The mayflies were represented by four genera with adequate numbers of individuals being collected. The oxygen content was above saturation. From observations on the bottom fauna, the dissolved oxygen content and the general appearance of the river, it may be concluded that serious pollution had not occurred recently at this point.

The next sample on the main stream was taken at the Woodland Cemetery two-and-one-half miles below the junction of the two branches. The biological condition of the river at this point indicated that serious pollution had occurred. Only two types of bottom organisms were found, both of which are indicative of polluted water. All of the cleaner water forms found in sampling upstream had been eliminated at this point. The bottom was observed to be covered with sewage slimes, some odour was apparent, and the river had an unsightly appearance. The dissolved oxygen content at that time was about 80 per cent saturation, and while at this level little damage would occur from oxygen depletion, it is obvious that the river must frequently be reduced to a septic condition.

At Byron bridge, five miles below the junction of the branches, the river is still seriously polluted, though not quite as bad as at the Woodland Cemetery. None of the sensitive types or organisms was present, and the fauna while more varied than at the Woodland Cemetery station was still composed of pollution-tolerant forms. The appearance of the river was not quite as bad as at the station above, but the stones in the riffles were covered with slime, and black muck was deposited in the quieter areas. The dissolved oxygen content at this time was not seriously depressed.

The last sample downstream was taken at the Thames River bridge south-east of Komoka, a distance of twelve miles below the junction of the north and south branches. The bottom fauna of the river at this point showed signs of improvement, but it was evident that recovery was not yet complete. Several representatives of the most resistant mayflies were collected at this point, but the population was mostly composed of pollution-resistant organisms. Minnows were found to be common at this station. Many of the stones were covered with algae though excessive growths did not occur. The river had a generally much cleaner appearance, and the dissolved oxygen was up to saturation.

CONCLUSION from Biological Surveys

Biological conditions in the Thames River defines the areas and severity of pollution very clearly. In general the north and south branches are not seriously affected with the possible exception of the north Thames at the junction. The main river as far as the Wharncliffe Bridge has been able to absorb the waste it receives. However, by the time it reaches the Woodland Cemetery the organic substances have reduced it to a septic condition, and for a distance of at least ten miles below the river had not recovered.

THAMES RIVER FLOW DATA

A dominant factor to be considered in the appraisal of sewage treatment plants is the volume of flow of clean water in the stream. It is obvious that as the flow in the Thames River diminishes or is retained at a low figure, there will not be sufficient water to dilute these effluents effectively. Greater treatment of all wastes is then required.

A tabulation of minimum monthly flows in c.f.s. for the years 1953-1957 inclusive follows:

Thames River-London Area

	1953	1954	1955	1956	1957
South Branch	58	72	74	63	54
North Branch	10	8	2	38	58
Main Branch	--	--	13	94	97

The main branch of the Thames River receives the combined flows from all branches, along with the total volume of treated sewage effluents and other drainage. For a period in the summer of 1955, the total flow in the river immediately downstream from the City of London measured less than the total daily average discharge from the three sewage treatment plants. This condition exists to some degree each year during the critical pollution period in the river. The Thames River flow data for the sampling period of May 20 to 31, 1958, are shown on figure 2. The lowest stream flows normally occur in the month of August. The dry weather flow of sewage from London alone would approximate 20.3 c.f.s.

TABLE 2 - THAMES RIVER FLOW DATA - MAY 1958

FANSHAWE DAM - N. BRANCH BELOW DAM

MAY	GAUGE HT.	FLOW (C.F.S.)
20	820.80	86
21	820.82	90
22	820.87	101
23	820.86	99
24	820.83	92
25	820.84	94
26	820.80	86
27	820.77	81
28	820.72	72
29	820.67	65
30	820.64	61
31	820.64	61
	AVERAGE	81

BYRON - MAIN RIVER - 4 MI. BELOW LONDON

MAY	GAUGE HT.	FLOW (C.F.S.)
25	735.76	212
26	735.66	181
27	735.58	159
28	735.52	143
29	735.50	138
30	735.49	136
31	735.48	134
	AVERAGE	157

The latter figures include the flow of sewage and other wastes from London.

SEWER OUTFALL SURVEY

An improvement in the efficiences of the different sewage treatment plants should be considered in conjunction with the control of all discharges from other outlets to the main river and its branches. This will include industrial wastes, storm overflows, and wastes from combined sewers.

The results of the investigation of all known sewer outlets are contained in this report. These outlets, both private and municipal were all sampled. The analyses of samples are tabulated (Table 3 and 4) and the sewer outlets are shown on an accompanying map (Figure 3).

In summarizing the results it is noted that the sewer outlets in the City discharge contaminated wastes with a maximum B.O.D. in excess of 900 p.p.m. and coliform organisms in excess of an M.P.N. of 240,000,000. In addition, industrial waste discharges in the same sewer outlets showed phenols in excess of 120 p.p.b. and cyanide of 10 p.p.m.

It is obvious that in addition to the pollution received by the Thames River from inefficient or overloaded sewage treatment plants these many sewer outlets for carrying surface water runoff contribute to the contamination of the river in varying amounts. Details on these outlets are given herewith:

TABLE 3 - SEWER OUTFALL TABULATIONS

Thames River, South Branch - North Bank

No.23	This is a stream flowing into the Thames River, and in close proximity to an old soap factory. At one time, the plant discharged trade wastes into the stream. The plant has now been dismantled.
No.22	Non-existent
No.21	This was a drain extending from the east end sludge drying beds of the municipal sewage treatment plant. It has now been eliminated.
No.20	Outlet from east end sewage treatment plant-by-pass.
No.19	Outlet from east end sewage treatment plant-effluent.
No.18	Non-existent
No.34	Egerton St. storm sewer. Reported to receive wastes from Empire Brass Co., Kellog's and other important industries in this area.
No.33	Storm sewer which discharges into a creek at Smith St.
No.32	Creek at Rectory and Trafalgar Sts., carries storm flow and serves as an overflow for a sanitary sewer. It was also reported to be carrying trade wastes from a bakery

	in the area. There was no flow at the time of this inspection.
No.31A	Ditch that carries waste from a dump at the plant of General Steel Wares Co.
No.31	This is a municipal sewer which carries storm water from Trafalgar Street. Oil wastes from General Steel are permitted to be discharged into the storm sewer.
No.30	Private drain from General Steel Wares Co., carries oil wastes from the plant.
No.29	Private drain believed to be discharging plant wastes into the Thames River.
No.28	Adelaide St. storm sewer. Reported to carry industrial wastes from Lawrason's Chemical Co., and the London-Petrolia Barrel Company.
No.37	Sanitary sewer overflow. There was no flow at the time of the first inspection.
No.38	McClary Company's private sewer. An oil film was detected in the flow. It was also noted that oil was seeping from a dump into the river at this location.
No.38A	McClary Company's storm drain.
No.39	McClary Company's drain. Yellowish wastes from the plant was being discharged into the Thames River through the drain at this time.
No.40	William St, storm sewer. No flow during this inspection.
No.41	Vanadium Alloys Company's drain from acid vats.
No.41A	Vanadium Alloys Company. Run-off from boiler-room.
No.41B	Municipal storm sewer--east of the London and Port Stanely Railway. No flow.

No.42 Colborne Street storm sewer. On the first visit, it was noted that soapy wastes were being discharged from Victoria Hospital into the storm sewer. This has now been corrected, and during the second visit no flow was evident. Further, this acts as an overflow during heavy rains.

No.43 Victoria Hospital drain. Sewage odour was quite evident but on the second visit, it was found that the drain had been covered with debris.

No.44 Victoria Hospital drain at the rear of the garbage-house. There was no flow at the time of inspection.

No.45 Waterloo Street overflow. Reported to carry raw sewage.

No.46A Wellington Street overflow. Reported to contain sewage. There was a considerable amount of oily wastes observed in the flow

No.53 South St. storm sewer. Reported to carry wastes from a large bakery.

No.52 Richmond St. storm sewer. Receives overflow from downtown sanitary sewers.

No.52A Labatt's storm sewer outlet. No flow.

No.56A Ridout St. storm sewer. Raw sewage was visible in the flow.

No.56 Bathurst St. storm sewer. This storm sewer was reported to be carrying wastes from Silverwood's Dairy and Holeproof Hosiery. This sewer also carried sanitary wastes.

No.55 York St. storm sewer. Reported to receive sanitary wastes together with wastes from service stations and possibly smaller industries.

No.54	King St. storm sewer. Receives overflow from sanitary sewers, certain wastes from the market buildings, and from service stations.

Thames River - South Branch
South Bank

No.59A	Becher St. storm sewer. There was no flow during inspection.
No.59	York St. storm sewer, located 15 yards northwest of the bridge. Reported to receive an overflow from a sanitary sewer. No flow.
No.58	Thames Park swimming pool outlet.
No.57	Ridout St. storm sewer. Located on the southwest side of bridge. Raw sewage was visible in the flow.
No.51	Traction Creek - outlet through large tile - 50 yards below old mill dam - opposite Labatt Brewery. Reported to carry sanitary wastes from Westminster Twp.
No.50	Gerrard St. near Carfrae Crescent. An 8-inch corrugated storm drain. No flow.
No.49	Non-existent.
No.48	A private drain. No Flow.
No.46	Wellington Street storm sewer. Located south-east of Wellington St. bridge. Receives overflow from the Grand Ave. sanitary sewer. Contains raw sewage.
No.47A	Foxbar Creek - reported to carry industrial and sanitary wastes. Discharges into Thames River in the vicinity of the South End S.T.P.
No.47	South End Sewage Treatment Plant outfall.
No.36	This is a creek which flows from Westminster Twp. to the River.

No.35A	Storm sewer located at the east end of Terrace St. No flow.
No.35	Creek flowing from Westminster Twp. through a closed garbage dump. Samples were taken at Thompson Rd. It is tiled from here to the Thames River.
No.27	Chelsea Heights Drain. Carries storm water from the area and discharges at the Egerton St. bridge.
No.26	Creek flowing from Westminster Twp. Discharges opposite East End S.T.P.

Thames River - North Branch - East Bank

No.62	Carling St. storm sewer, 25 yds. north of Dundas St. bridge. Reported to receive an overflow from a sanitary sewer during heavy rainfall. No flow.
No.63	Blackfriar St. storm sewer, located on the north-east side of the bridge. Receives overflow from a sanitary sewer. No flow.
No.64	Carling Creek. Flows from the north-east section of London, into the Thames River, 50 yards below Ann St. Hyman Tannery, Talbot Printing Co., service stations and other industries may contribute to the pollution of the creek. During the time of inspection, the creek was dark red in colour on discharging to the river.
No.65	Ann St. storm sewer. Receives an overflow from a sanitary sewer during heavy rainfall.
No.66	Oxford St. storm sewer. Located between Oxford St. and railway bridge. During heavy rainfall this storm sewer receives an overflow from a sanitary sewer.
No.70	Gibbon Park swimming pool outlet.

No.71 Gibbon's Park storm sewer. Discharges into an open
69 drain which flows into the Thames River. Sanitary
67 wastes may be present in the flow.

No.68 Victoria St. storm sewer. Surface drainage only.

Thames River - Main Branch - North Bank

No.61 Wharncliffe Road Storm sewer. Located on north-west side of bridge. A new bridge was under construction during the time of inspection.

No.108 Trot's drain. Flows north-west of Douglas Ave. pumping station with the outlet to the river at the railway bridge.

Thames River - Main Branch - South Bank

No.60 Wharncliffe Rd. storm sewer. North-west side of Wharncliffe Rd. bridge, which was under construction during time of inspection.

No.93 River St. storm sewer, located at Riverview and River Sts. Raw sewage was visible in the flow.

No.95 Johnston St. storm sewer. Discharges into an open ditch. Reported to be discharging sanitary wastes.

No.101 The "Coves" at the end of McAlpine Ave. The outlet could not be located. It was reported that septic tank effluents from the dwellings in the locality drain into the "Coves" at this point.

No.96 The "Coves" at Springbank Drive.

TABLE 4 - LONDON SEWER SURVEY

SAMPLING POINTS		B.O.D. (PPM)	SOLIDS			PH	PHENOL (PPB)	CYANIDE (PPM)	COLIFORMS (M.P.N.
			TOTAL	SUSP. (PPM)	DISS.				
23	NON-EXISTENT								
22	NON-EXISTENT								
21	NON-EXISTENT								
20	S.T.P. BY-PASS								
19	S.T.P. OUTFALL								
18	NON-EXISTENT								
34		12	848	262	586	7.7	30	TRACE	24,000
		36	608	---	---				240,000
33		96	1312	676	636	---	--	--	240
32	NO FLOW								
31A	NO FLOW								
31		38	1344	290	1054	7.6	8	0	24
		0.4	846	---	---				0
30		30	642	60	582	7.6	120 +	0	0
		275	748						0
29		4.8	392	8	394	7.4	7	0	0
		5.2	1162						0
28		23	2504	1104	1400	6.5	30	0	240
		5.8	454						24,000
37	NO FLOW								
		36	694	---	---				10,000,000+
38		2	588	14	574	7.7	8	0	2,400
		15	884	---	---				2,400
38A		14	616	10	606	7.65	5	0	24
39		52	594	34	560	8.6	10	10	240
		3.0	510	---	---				0
40	NO FLOW								
41		72	674	4	670	3.1	20	0	---
		5.6	1474						24
41A		13.6	338	20	318	6.8	4	0	---
		3.4	470	---	---				24,000
41B	NO FLOW	---	---	---	---				---
		180	2642						0

SAMPLING POINTS		B.O.D. (PPM)	SOLIDS TOTAL	SUSP. (PPM)	DISS.	PH	PHENOL (PPB)	CYANIDE (PPM)	COLIFORMS (M.P.N.)
42		269	1092	514	678	--	---	---	240,000
43		10.2	416	4	4.2	--	---	---	2,400
		82	576	---	---				2,400
44	NO FLOW	---	---	---	---				---
		26	596	---	---				2,400
45		164	1238	222	1016	--	---	----	240,000,000 +
		290	1174	---	---				2,400
46A		129	850	330	520	7.3	80	0	240,000,000 +
		552	1066	---	---				24,000,000 +
53		17	830	442	388	7.7	40	0	240,000
		976	852						2,400,000
52		26	834	332	502	--	80	0	240,000
		816	1288	---	---				0
52A	NO FLOW	---	---	---	---	--	---	---	---
56A		12	1490	962	528	--	---	---	240,000
56		84	654	70	582	7.6	20	0	2,400,000
		328	954						24,000,000 +
55		24	570	326	244	7.9	40	0	240,000
54		222	1124	118	1006	7.6	50	0	24,000,000 +
		232	1652						24,000,000 +
59A	NO FLOW	---	---	---	---	--	---	---	---
59	NO FLOW	---	---	---	---	--	---	---	---
		203	946	---	---				24,000,000 +
58	NO FLOW	---	---	---	---	--	---	---	---
57		39	342	30	312	--	---	---	240,000
51		1.9	294	4	290	--	---	---	2,400
50	NO FLOW	---	---	---	---	--	---	---	---
49		2.2	652	---	---				2,400
48									
46		169	698	182	516	--	---	---	2,400,000
47A		11.6	568	106	462	7.54	TRACE	0	
47	S.T.P. OUTFALL	---	---	---	---				240,000
		83	902	---	---				
36		0.6	344	38	306	7.6	TRACE	0	2,400
		1.1	1278	---	---				0

SAMPLING POINTS		B.O.D. (PPM)	SOLIDS			PH	PHENOL (PPB)	CYANIDE (PPM)	COLIFORMS (M.P.N.)
			TOTAL	SUSP. (PPM)	DISS.				
35A	NO FLOW								
35		49	922	144	778	---	---	---	2,400
		29	1278						240
27		1.6	3042	2788	254				240,000
		2.4	469	---	---				24,000
26		0.6	280	6	274				SAMPLE BROKEN
		2.6	544	---	---				2,400,000
62	NO FLOW	--	---	---	---				---
		15	680	---	---				---
63	NO FLOW								
64		27	446	132	314	7.5	18	0	2,400
65	NO FLOW								
66		23	892	656	236	---	---	---	2,400
70	NO FLOW								
68	NO FLOW								
71		16	426	158	268				2,400,000
		600	808	---	---				2,400,000
67		16	576	---	---				24,000
69		10	582	---	---				240
61		24	129[illegible]	988	304				0
		30	508	---	---				
108		6.2	584	158	426	---	---	---	---
		200	950	---	---				0
60		4.2	2830	2182	648				240,000
93		41	500	108	392				24,000,000 +
		500	808	---	---				24,000 +
95		97	842	278	564				2,400,000
		160	734						0
100	SAMPLE BROKEN								
		240	820	---	---				0
96		6.2	314	22	292				24,000
		80	472	---	---				24,000

SEWAGE TREATMENT PLANTS

The three City sewage treatment plants - the East End with a capacity of 4 million gallons per day (M.G.D.), the West End Plant with a present capacity of 6 M.G.D. which is being expanded to treat a daily flow of 11 M.G.D., and the South End Plant with a capacity of 1 M.G.D., are activated sludge plants. Such plants are normally designed to achieve 95% reduction in organic and solids concentrations and as a result should secure in the effluent a Biochemical Oxygen Demand (B.O.D.) not in excess of 15 parts per million and a somewhat similar figure for Suspended Solids. The bacterial count (Coliforms) should also be reduced by effective chlorination.

West End Sewage Treatment Plant

Flow - An estimate of flow through the treatment plant was provided by the City Engineering Department as follows:

Average - 6 M.G.D.
High Average - 8.6 M.G.D. (av.peak daily)
Maximum - 9.6 M.G.D. (at most 1 hour daily)

During storm flow periods 10.5 M.G.D. is treated, and the excess is by-passed untreated to the Thames River.

The attached flow graph (Figure 4) shows daily variations.

Aeration - At the present time sixteen tanks, or 8.8% of the total capacity of aeration is employed for sludge storage. In several weeks, when the new section of the plant is put into operation, only ten tanks, or 5.5% will be used for sludge storage. In evaluating the capacity of this plant, it is to be noted that the 6 M.G.D. rated capacity includes the section of aeration which is being used for sludge storage. As a

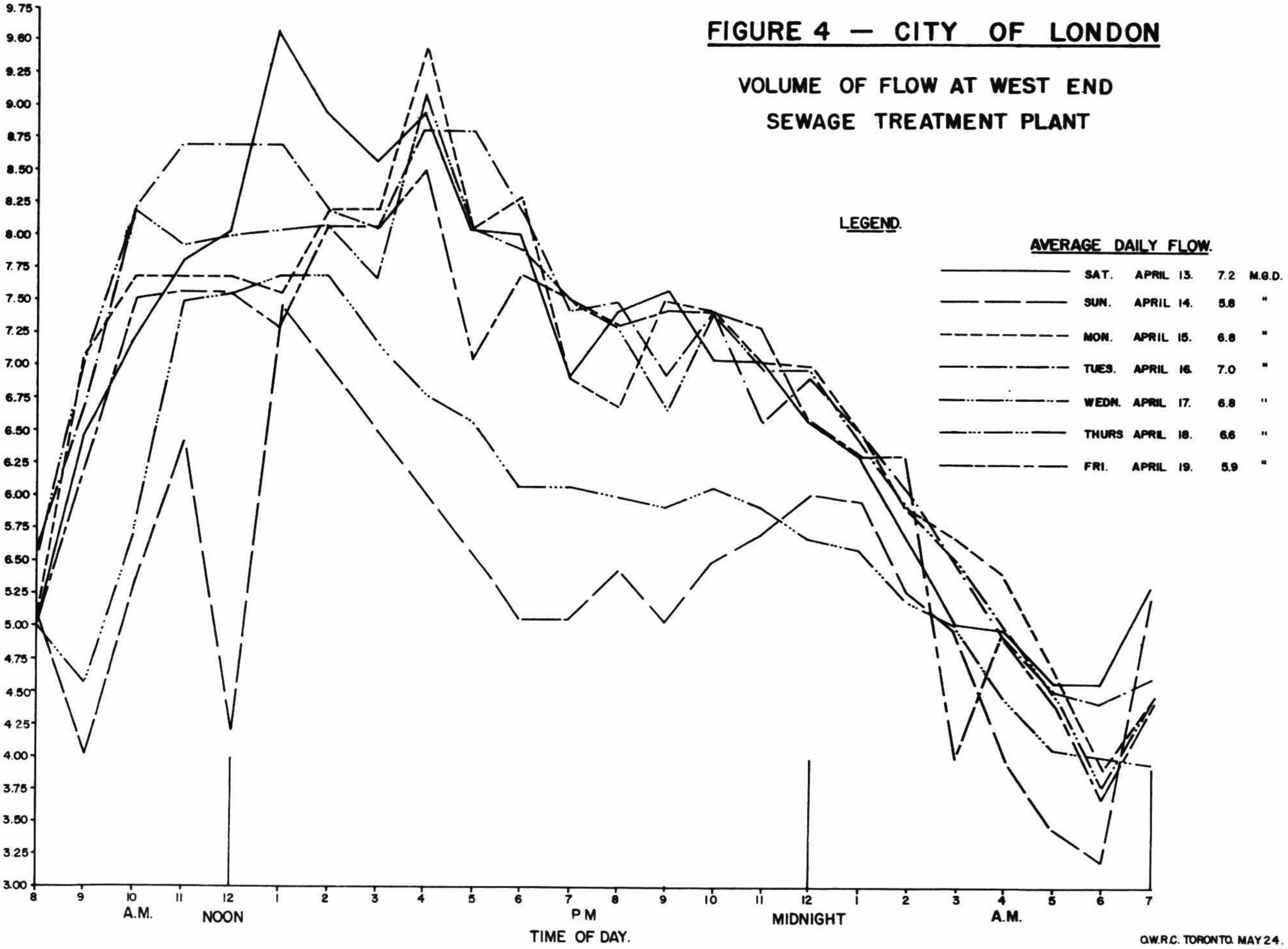


FIGURE 4 — CITY OF LONDON

VOLUME OF FLOW AT WEST END SEWAGE TREATMENT PLANT

Q.W.R.C. TORONTO. MAY 24. S.H.

result of this practice the total capacity for oxidation purposes is less than 6 M.G.D.

The limitations imposed on the aeration capacity affects drastically the operating performance of this plant. This is evidenced by under aeration, necessitating a low sludge percentage in the aeration tank and a sludge floc being discharged over the effluent weir of the final settling tanks.

East End Sewage Treatment Plant

An estimate of flow through the treatment plant was provided by the City Engineering Department as follows:

Average - 3 M.G.D. (Includes Imhoff and Activated Sludge)
High Average - 3.76 M.G.D. (1 hour at most)
Maximum - 4 M.G.D. (less than 1 hour)

During storm flow periods 4.75 M.G.D. is treated, the excess is by-passed to storm tanks with 10 to 15 minute capacity at peak flow and is then discharged to mix with the chlorinated effluent before going to the river. (Figures 5 and 6).

Two flow graphs are attached showing daily and weekly variations.

Aeration - At the present time four tanks, or 14% of the total aeration capacity are being used for sludge storage. In evaluating the capacity of the plant the 4 M.G.D. figure is based on all aeration tanks being used for aeration. With four tanks serving for sludge storage the actual capacity is proportionately less than 4 M.G.D.

South End Sewage Treatment Plant

Flow - The estimated flow as determined by the City Engineering Department for this plant was given as 0.75 M.G.D. The average flow during an eight hour period (daytime) is 1.3 M.G.D.

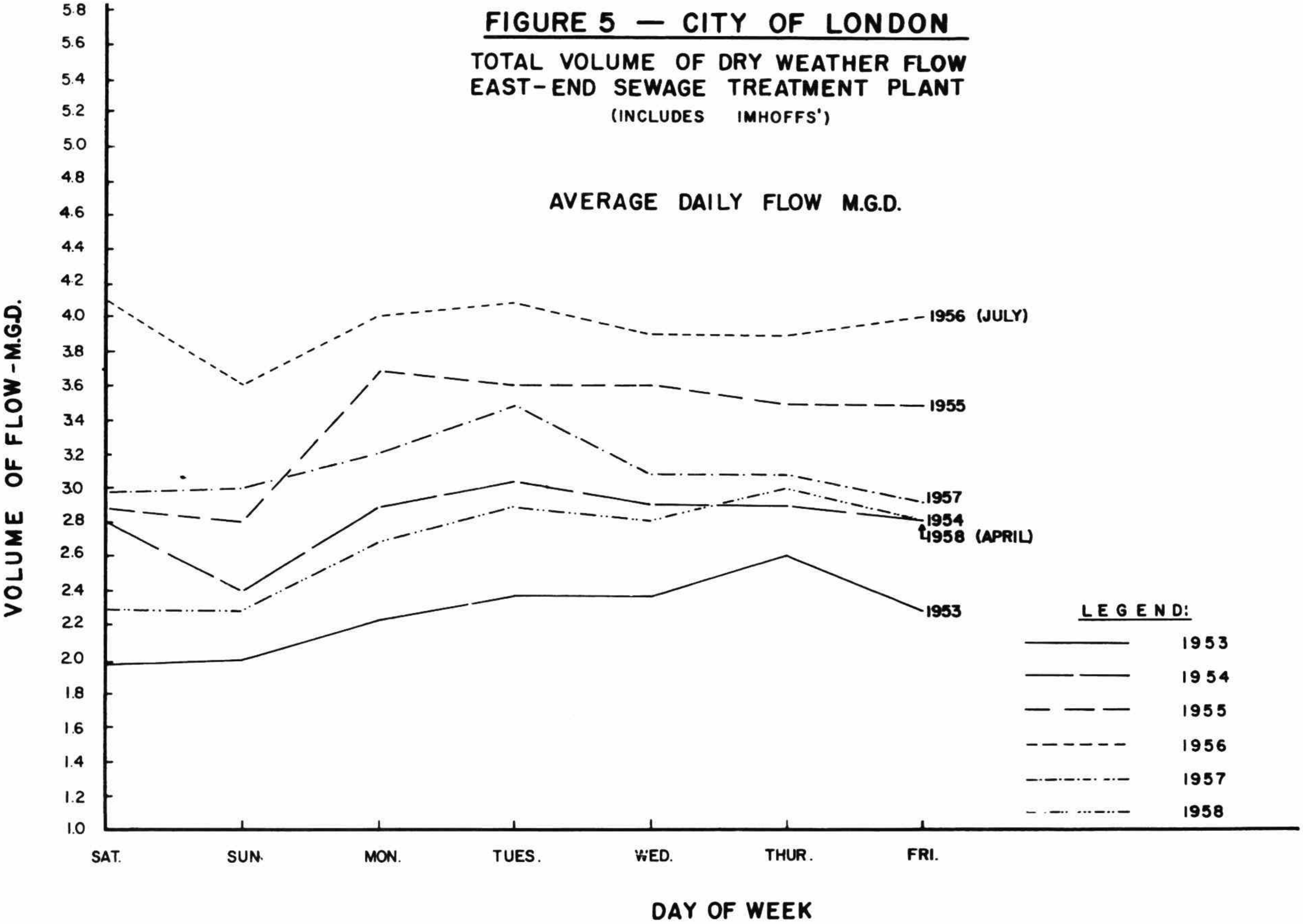


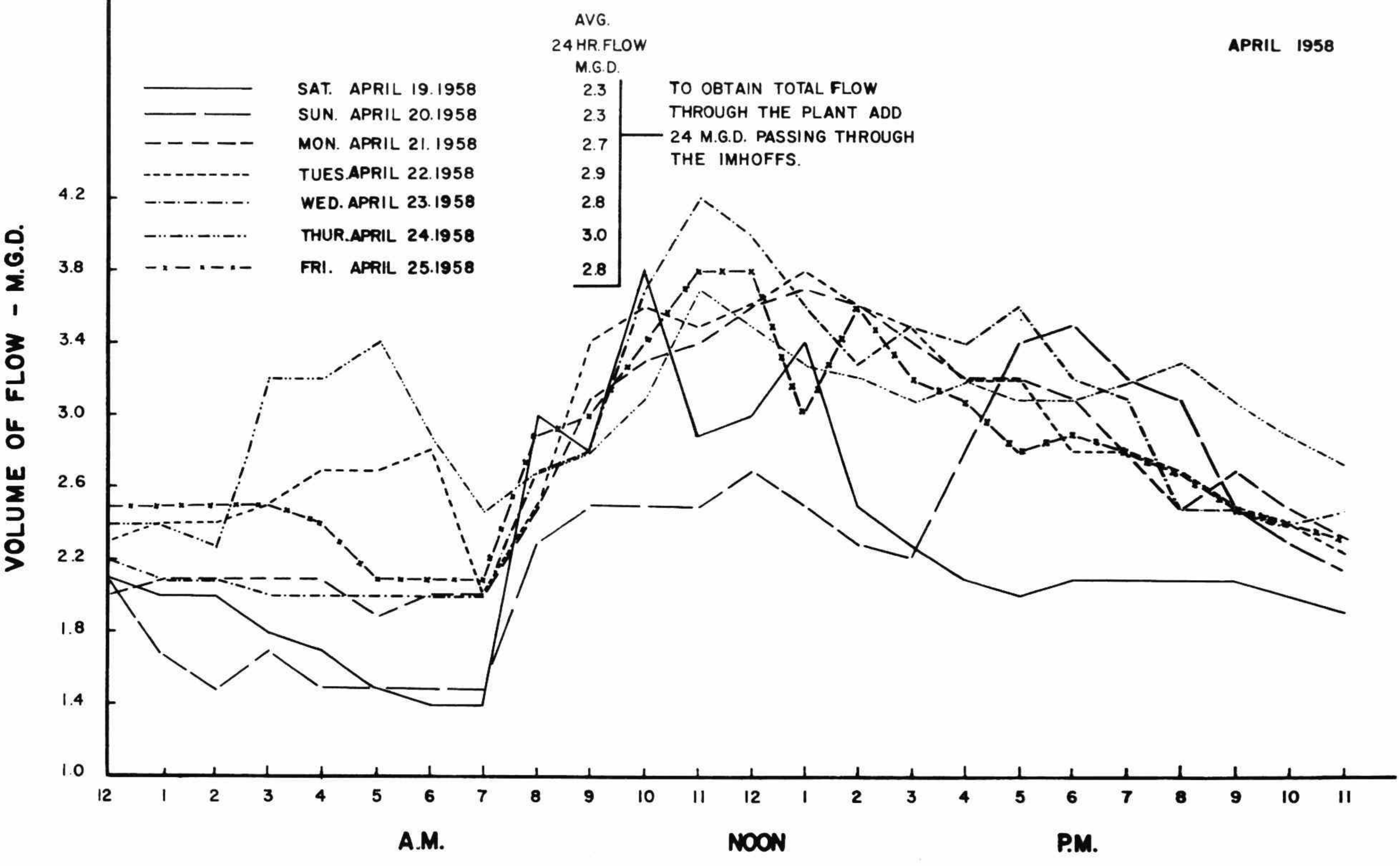
FIGURE 5 — CITY OF LONDON

TOTAL VOLUME OF DRY WEATHER FLOW
EAST-END SEWAGE TREATMENT PLANT
(INCLUDES IMHOFFS')

O.W.R.C. TORONTO MAY 1958
PREPARED BY: J.R.

FIGURE 6 — CITY OF LONDON

DRY WEATHER FLOW AT EAST-END
SEWAGE TREATMENT PLANT



TO OBTAIN TOTAL FLOW THROUGH THE PLANT ADD 24 M.G.D. PASSING THROUGH THE IMHOFFS.

TIME OF DAY

O.W.R.C. TORONTO MAY 1958
PREPARED BY: J.R.

It is noted that the plant capacity is 1 M.G.D., and therefore during the day there is a direct discharge of raw sewage to the effluent sewer. Approximately .05 M.G.D. is discharged untreated for three or four hours daily. During storm flow periods the flow in excess of 1.25 M.G.D. is bypassed untreated to the river.

Aeration - The aeration capacity is totally inadequate, and the operating results are thus far below recognized standards. In fact, on occasion, analyses have shown zero efficiency in the plant operation.

Operating Results for all Plants - The sanitary chemical analyses of samples submitted to the Commission's laboratory have been tabulated for the years 1955, 1956, and 1957, as shown in Tables 5 and 6 and 7. The yearly average summary of results is as follows for all treatment plants:

	5 DAY B.O.D. (PPM)		SUSPENDED SOLIDS (PPM)		PERCENT REDUCTION	
	RAW	EFFL.	RAW	EFFL.	B.O.D.	SUSPENDED SOLIDS
WEST END PLANT						
1955	337	29	456	80	91	82
1956	249	49	354	76	30	79
1957	229	50	410	62	78	82
EAST END PLANT						
ACTIVATED SLUDGE						
1955	171	23	247	44	87	82
1956	279	17	290	31	94	89
1957	172	16	172	31	90	80
TRICKLING FILTER						
1955	341	50	224	75	85	67
1956	188	37	190	53	80	72
1957	240	32	150	31	74	80
SOUTH END PLANT						
1957	189	91	225	198	48	47

These effluent samples on the sewage treatment plants collected over a period of three years (1955 to 1957) show considerable variation in quality. A comparison should be made with the standard of 15 p.p.m. or less of B.O.D. and

TABLE 5

LONDON SEWAGE TREATMENT PLANT

ONTARIO WATER RESOURCES COMMISSION ANALYSES 1958

(WEST END)

DATE	TIME	5 DAY B.O.D. – P.P.M.		TOT. SOL. – P.P.M.		SUSP. SOL. – P.P.M.		PERCENT REDUCTION			
		RAW	EFFL.	RAW	EFFL.	RAW	EFFL.	B.O.D.	TOT. SOL.	DISS. SOL.	SUSP. SOL.
MAY 25/55	7am. — 3pm.	422	16	1916	646	764	82	96	66	51	89
JUNE 25/55	7am. — 3pm.	534	22	464	688	440	62	96	51	35	86
JUNE 27/55	GRAB SAMPLE — 4pm.	264	89	1662	840	620	70	66	49	26	89
JULY 21/55	7am. — 3pm.	270	—	1028	—	270	—	—	—	—	—
SEPT. 28/55	7am. — 3pm.	220	30	1184	614	366	64	86	43	35	83
OCT. 26/55	7am. — 3pm.	100	48	1324	766	468	80	52	42	20	81
NOV. 17/55	7am. — 3pm.	240	28	1342	780	426	110	88	42	27	74
1955 AVERAGE		337	29	1409	722	456	80	91	50	32	84
FEB. 15/56	7am. — 3pm.	300	34	1538	776	490	114	89	50	47	77
JAN. 25/56	7am. — 3pm.	360	35	1814	868	572	136	90	52	41	76
APRIL 26/56	7am. — 3pm.	220	27	1340	778	348	68	88	42	28	80
MAY 30/56	7am. — 3pm.	110	58	1058	816	264	70	48	23	6	74
JUNE 28/56	7am. — 3pm.	310	64	1314	876	438	84	79	33	10	81
JULY 26/56	7am. — 3pm.	120	34	814	674	204	44	72	17	-3	79
AUG. 9/56	7am. — 3pm.	360	112	1022	784	190	54	86	23	12	72
OCT. 3/56	7am. — 3pm.	206	52	1366	796	224	60	75	42	36	82
DEC. 17/56	7am. — 3pm.	252	27	1266	718	324	52	90	43	19	85
1956 AVERAGE		249	49	1281	787	354	76	80	39	23	79
JAN. 30/57	7am. — 3pm.	175	21	1146	852	254	62	88	25	12	76
MARCH 6/57	7am. — 3pm.	210	47	1252	866	388	100	78	31	45	74
MARCH 21/57		224	48	1136	800	350	126	79	30	14	65
APRIL 29/57		247	18	1130	734	250	58	93	35	23	77
MAY 23/57		164	25	1494	780	664	46	85	48	24	93
JUNE 26/57		306	86	1282	798	859	18	72	38	-82	98
JULY 24/57		120	48	898	728	266	46	60	19	-20	83
AUG. 14/57		226	89	1418	922	356	64	60	35	20	82
OCT. 30/57	7am. — 3pm.	292	61	1330	690	340	20	79	48	32	94
NOV. 28/57	7am. — 3pm.	328	40	1344	800	374	76	88	40	28	82
1957 AVERAGE		230	50	1244	797	418	62	78	40	10	82
JAN. 29/58	7am. — 3pm.	230	65	1160	844	296	108	72	27	15	55
FEB. 19/58	7am. — 3pm.	299	81	1352	838	378	86	73	38	23	77
APRIL 10/58	7am. — 3pm.	86	4	1290	848	352	94	95	34	20	73
MAY 21/58	7am. — 3pm.	338	58	1520	912	390	90	83	40	27	77

TORONTO SEPT. 1958 J.R.

TABLE 6

LONDON SEWAGE TREATMENT PLANT

(EAST END)

ONTARIO WATER RESOURCES COMMISSION ANALYSES 1958

DATE	TIME	ACTIVATED SLUDGE SECTION										TRICKLING FILTER SECTION									
		5 DAY B.O.D.		TOTAL SOLIDS		SUSPENDED SOLIDS		PERCENT REDUCTION				5 DAY B.O.D.		TOTAL SOLIDS		SUSPENDED SOLIDS		PERCENT REDUCTION			
		RAW.	EFFL.	RAW.	EFFL.	RAW.	EFFL.	B.O.D.	TOT. SOL.	DISS. SOL.	SUSP. SOL.	RAW.	EFFL.	RAW	EFFL.	RAW.	EFFL.	B.O.D.	TOT. SOL.	DISS. SOL.	SUSP. SOL.
MAY 25/55	7a.m.- 3p.m.	81	23	966	558	150	36	72													
MAY 27/55	7a.m.- 3p.m.	165	13	1018	502	246	30	92	51	39	88	384	92	1076	744	276	84	76	31	17	69
JUN. 27/55	GRAB 4p.m.	394	13	984	484	280	32	97	57	36	89	732	57	1868	618	424	110	93	67	65	74
JULY 21/55	7a.m.-3p.m.	188	37	926	662	242	24	80	27	7	90	478	65	1560	726	252	78	87	53	57	69
SEPT. 28/55	7a.m.-3p.m.	180	16	946	550	218	58	91	42	32	74	250	120 x)	878	654	218	70	52	25	12	68
OCT. 26/55	7a.m.-3p.m.	300	26	1358	694	418	68	91	47	32	84	315	24	1154	676	200	56	92	41	35	72
NOV. 17/55	7a.m.-3p.m.	110	22	934	568	208	58	88	39	28	76	280	20	1420	588	174	88	93	59	60	50
1955 AVE.		171	23	1023	589	247	44	87	42	30	82	341	50	1218	678	224	75	85	44	39	67
FEB. 15/56	7a.m.-3p.m.	215	8	988	478	202	46	96	52	34	77	150	20	830	496	172	50	87	40	32	71
JAN. 25/56	7a.m.-3p.m.	180	20	946	694	322	62	89	27	1	81	172	16	866	628	208	66	91	28	14	68
APR. 26/56	7a.m.-3p.m.	786	17	1924	602	642	26	98	69	55	96	148	31	1064	682	182	54	79	37	29	70
MAY 30/56	7a.m.-3p.m.	360	23	1170	712	384	62	94	39	17	84	144	36	884	734	172	82	75	17	8	53
JUN. 28/56	7a.m.-3p.m.	182	33	1060	662	214	20	73	38	24	91	312	102	990	832	160	42	67	16	5	74
JULY 26/56	7a.m.-3p.m.	150	10	1088	598	240	4	93	45	30	98										
AUG. 9/56	7a.m.-3p.m.	130	14	914	630	106	12	89	31	24	89	209	25	1142	754	256	42	83	34	20	84
OCT. 3/56	7a.m.-3p.m.	274	22	1126	686	244	28	92	39	25	89	(262	201 x)	2224	914	584	76	23	59	49	87)
DEC. 17/56	7a.m.-3p.m.	235	92	986	564	252	22	96	43	26	91	170	32	1010	652	174	38	81	35	27	78
1956 AVE.		279	17	1134	625	290	31	94	45	26	89	188	37	970	683	190	53	80	30	19	72
JAN. 30/57	7a.m.-3p.m.	232	21	836	548	154	14	91	35	22	81	353	46	1286	792	164	40	87	38	33	76
MAR. 6/57	7a.m.-3p.m.	170	11	1210	636	214	44	94	47	40	79	(203 x)	101 x)	930 x)	834	156	46	50	10	1	71)
MAR. 21/57	7a.m.-3p.m.	169	6	706	540	122	20	96	24	11	84	182	44	886	706	138	58	86	19	11	58
APR. 29/57	7a.m.-3p.m.	266	7	868	546	256	20	98	37	14	92	234	7	924	568	204	28	97	38	25	86
MAY 23/57		197	7	906	518	180	2	96	43	29	99	182	10	866	278	174	12	94	68	62	93
JUN. 26/57		162	7	816	624	180	86	96	24	15	52										
JULY 24/57		119	19	1264	556	138	24	84	56	53	83	221	5	802	532	94	6	98	34	26	94
AUG. 14/57		131	48	786	616	126	46	63	22	14	63	300	12	808	544	122	22	96	33	24	82
OCT. 30/57		126	22	820	626	182	22	83	23	6	88										
NOV. 28/57		159	26	786	634	186	38	84	20	1	80										
1957 AVE.		171	17	900	639	173	32	89	31	22	80	240	32	955	608	150	31	89	34	26	80
JAN. 29/58	7a.m.-3p.m.	295	7	876	580	130	16	98	34	75	88										
FEB. 19/58	7a.m.-3p.m.	289	11	1190	598	152	10	96	50	43	93										
APR. 10/58	7a.m.-3p.m.	82	4	782	650	146	30	94	17	3	79										
MAY 21/58	7a.m.-3p.m.	216	25	1162	638	104	14	89	45	41	87										

x) SMALL CLAR.

AUGUST 1958 H.E.

TABLE 7

LONDON SEWAGE TREATMENT PLANT

ONTARIO WATER RESOURCES COMMISSION ANALYSES 1958

(SOUTH END PLANT)

DATE	5 DAY B.O.D. ppm		TOTAL SOLIDS ppm		SUSPENDED SOLIDS ppm		PERCENT REDUCTION				TIME
	RAW	EFF.	RAW	EFF.	RAW	EFF.	B.O.D.	TOTAL SOLIDS	DISSOLVED SOLIDS	SUSPEND. SOLIDS	
MAY 25/55	126	94	720	802	194	274	27	−11	0	42	
JUNE 26/57	251	89	978	892	256	121	69	9	−7	52	

Suspended Solids expected in the effluents. The East End plant, activated sludge section, achieves this result in the B.O.D. but not in the Suspended Solids. All other yearly averages exceed this standard.

The percentage reduction in both BOD and Suspended Solids in all three plants does not reach the objective of 95%,

INDUSTRIES

Twenty-one industries in the City of London were visited to obtain information on volumes, character and points of discharge of industrial wastes. Industries that discharge directly to open ditches or streams, as distinct from those connected to the sanitary sewers, were given special attention. Those industries that had no industrial wastes discharging to surface waters are not included in this report.

The relevant information regarding the industries concerned is found below.

(a) Canadian National Railways - Egerton Street

At this location freight and passenger cars are repaired and reconditioned.

Wastes from the shops on Egerton Street will probably contain sodium hydroxide from the cleaning of the journal boxes in the passenger truck shop. Other wastes will result from the washing of the storage battery cases. The batteries are used to provide auxiliary lighting in the passenger coaches during operation.

These wastes may be expected to have abnormal pH values.

(b) Coca-Cola Limited - Dundas Street

Although this company does not discharge directly to the Thames River, it is connected to the storm sewer on Dundas Street which in turn empties into the Egerton Street storm sewer. The Egerton Street storm sewer discharges into the Thames River, south branch.

Normal operation at this plant is from 8 a.m. to 4:30 p.m. During this time the waste waters are likely to contain excess syrup lost during bottling operations, cleaning solutions used in cleaning the bottles, and any residual Coca-Cola not consumed but left in the bottles. At night, for 3 to 4 hours up to 9 o'clock the delivery trucks are washed. This wash water also goes to the storm sewer.

The backwash from the charcoal water filter is discharged to the storm sewer. This takes place every night after bottling ceases.

(c) Commando Chrome Plating Co. Ltd. - 53 St. Julien St.

Although this plant discharges industrial wastes neither to a storm sewer nor to the Thames River, it does drain them onto open ground at the rear of the place of operation. Here the wastes soak into the ground after travelling only a very short distance. There is a possibility at some future date if operations increase or the ground becomes saturated that the waste will reach the Thames River.

This industry does plating of metallic objects, and there is a possibility of toxic amounts of chromium, copper, cyanide, nickel, cadmium, and zinc being discharged in the wastes.

(d) Emco Limited - Dundas Street East

This company manufactures plumbing and heating supplies, bath fittings, pipes and fittings for industry.

This industry employs a great many materials used in normal electro-plating operations. These procedures entail the use of cleaners (both acid and alkali), nitric and other acids, cyanide, chromium, nickel, and copper salts.

Many of these materials are discharged to the sump under the plating room floor, and there any soluble substances will flow to the outlet sewers and then out to the Dundas Street storm sewer. The sump is hosed out about once a month, and a catch basin which is connected to this sump is cleaned out once a year.

These wastes may be expected to have a toxic effect on aquatic organisms in the receiving body of water.

(e) General Steel Wares Limited - McClary's Division - Adelaide St. South

This firm manufactures electric ranges, refrigerators, furnaces, hotel and hospital kitchen equipment, bath tubs, washing machine tubs and architectural steel panels.

The materials used in the processing which may find their way to the Thames River are sulphuric, chromic, muriatic and nitric acids, iron phosphate, nickel, zinc and copper salts, metal cleaners, japan coating and cyanide solutions. Some of these solutions normally go to the city sanitary sewers and only discharge by means of overflows from the storm sewers to the Thames River.

Some of the tanks containing these solutions are said to be periodically dumped. For example, the cleaner tank in the plating room is dumped every two to three months; the muriatic tank is dumped once a year, as is the sulphuric acid tank; the bright dip for the zinc plating is dumped every three months; the nitric acid tank is dumped every two weeks. In addition to the dumpings of these tanks, there is material discharged in the overflow rinses in the various operations. The latter will probably be drained entirely into the sanitary sewers.

These chemical wastes now being discharged are detrimental to a watercourse because of their content of toxic substances and their abnormal pH values.

(f) C.S. Hyman Leathers - Richmond Street

This Company tans sole leather, upper leather welting and manufactures cutstock for shoes.

The discharges of industrial waste go to the sanitary sewer on Talbot Street. However, the material being discharged down the sewer is said to be clogging the screens at the Douglas Avenue pumping station, and while the screens are being cleaned the waste is diverted to the storm sewer. The chief offending matter in this case is the hair lost during the processing in the sole leather department. Included in this waste would be a large amount of soluble organic matter, Thus this waste would be objectionable because of the hair and the large amount of decomposable organic material which would decrease the dissolved oxygen content in the river, raise the B.O.D. content, and might produce septic conditions.

Treatment works are under construction to remove the hair and solids that would otherwise go to the sewer.

(g) Jones Box & Label Company Limited - Dundas Street

This plant produces folding and set-up boxes and does lithographing and printing.

The amount of industrial waste discharged is very small, and in most cases is said to be less than 10 gallons a week of each separate type of waste. The wastes are mostly those resulting from developing, etching and preparing lithographing plates. A small number of glue containers are washed about once a month. Iosol and detergent are used to wash dampening rolls.

These wastes are discharged to the Dundas Street storm sewer and eventually find their way to the Thames River.

(h) H. J. Jones & Sons - Dundas Street East

This Company does lithographing and printing, and produces hosiery packing and hercules boxes.

This plant discharges similar amounts and types of industrial waste as the preceding. The wastes also discharge to the same storm sewer.

(i) Kellog Company of Canada Ltd. - Dundas Street

This Company produces corn flakes, bran flakes, rice krispies, corn pops, special protein and all bran cereal foods and some animal feeds.

In the preparation and manufacture of these cereal foods and animal feeds, certain wastes are discharged to the sewers. Some of the wastes go to the sanitary sewers and others to the storm sewer.

The wastes will consist mainly of organic matter from the washing of the corn and wheat, exhausts from the various cookers, and drying of the corn meal.

This organic matter, if it reaches the river will adversely affect the dissolved oxygen content of the water.

(j) Kelvinator of Canada Ltd. - Dundas Street East

Refrigerators, ranges and deep freezers are manufactured at this plant.

The wastes may possibly contain dissolved iron from the various water baths used for checking leaks in compressor lines and shells, weak sulphuric acid from pickling operations, paint pumped from the paint sump once a month, wastes from the cadmium and tin plating, and backwash from water softening operations.

These wastes are objectionable due to low pH values, paint residue, and the possibility of toxic effects from the discharge of cadmium. These flows will also eventually reach the Egerton Street storm sewer.

(k) John Labatt Limited - Simcoe Street

The processes carried out at the John Labatt Brewery on Simcoe Street which result in the discharge of liquid wastes to the sanitary storm combined sewer (Thames River sewer) are washing and rinsing of bottles and cans, keg racking, liquid from drying of yeast, liquid from drying of spent grain, water from regeneration and backwashing of zeolite and hydrogen softeners, floor washings and cooling water.

Material formerly wasted to the sewers was recovered in two of the processes. A drying machine has been installed for recovery of yeast which is bagged and sold for turkey food, The spent grains are mechanically dried and then further dried in an oil fired drum. All of the industrial and sanitary wastes from this plant discharge to a large sewer called the Thames River sewer. This combined storm and sanitary sewer has a storm water overflow to the Thames River which operates during periods of heavy run-off. During normal weather, no overflow to the Thames River from this sewer is said to occur.

(l) London & Petrolia Barrel Company - Little Simcoe Street

The London and Petrolia Barrel Company produces wood and stainless steel barrels, milk containers, soft drink coolers, syrup containers, chemi-cake containers, stainless steel valves, and in the future will produce farm wagons and boat-trailers. The plant located on Little Simcoe Street employs between 110 and 160 persons working from one to three shifts per day depending on production.

Two acid baths are used to develop a finish on stainless steel barrels. One called the pickle bath is made up with 3 to 7% hydrofluric acid plus 0.3 to 10% nitric acid. This bath containing 450 gallons is drained every three weeks when spent. The other bath contains 260 gallons of 7% nitric acid which is drained every two to three months when spent.

A large amount of water is used to flush out the spent acid when the bath is drained. In addition, water from flowing rinses give additional dilution. The flow is discharged to a storm sewer with outfall to the Thames River at the north-east corner of the Adelaide Street bridge. Sanitary waste is discharged to the sanitary sewer on Little Simcoe Street.

(m) London Motor Products - Talbot Street

This firm does body repair work to automobiles. The plant is connected to the large concrete storm sewer that discharges to the Thames River at or near Ann Street. The car washings, excess paint and floor washings flow into this sewer.

These wastes could cause a discolouration or oily condition in the river.

(n) McCormick's Limited - Dundas Street East

This Company manufactures assorted biscuits and candy.

The wastes could contain small amounts of the raw materials that are used, such as sugar, flour, flavourings, cocoa, glucose, vegetable oil and citric acid. Some of the wastes are also discharged from the barometric condensers, water softener backwashes and boiler blowdown.

These wastes would contain organic matter which might affect the dissolved oxygen in a receiving stream.

(o) Nopco Chemicals (Canada) Limited

The Nopco Chemical Plant at Piccadilly and St. George Streets in London is a producer of fat and oil base chemicals, such as sulphonated oils blown rape seed oil, cold pressed neatsfoot oil, drawing compounds, tanning materials, and anti-foam agents.

The operations consist of heating in vats, kettles and autoclaves blowing with air, mixing and cooling. There are no waste by-products resulting from the operations. The wastes result from cleaning of utensils,

A wooden tank eight feet in diameter and about six feet deep has been installed for separation of oil and grease before the effluent discharges to the sanitary sewer. All floor drains flow to two sumps from which pumps carry the flow to the wooden tank. The tank was equipped with a skimming device for separation of the oil and grease. An air line bubbled air into the tank as an aid in oil and grease separation.

The effluent from the settling tank was discharged to the sanitary sewer. Recovered oil and grease is removed to the city dump. The sanitary wastes from 30 to 35 employees discharge to the sanitary sewer.

(p) Richards-Wilcox Canadian Company Ltd. - Chelsea Green

This firm manufactures or fabricates large doors, heavy hardware, cranes and monorails.

Some wastes that may arise from these operations and that reach the Thames River are from the paint spray booths. There is a possibility of some cyanide being discharged from the case hardening operation which is a small one in terms of size of baths used and number of pieces being treated.

(q) Silverwood Dairies Limited - Bathurst Street

The Silverwood Dairy on Bathurst Street in London processes and produces creamery butter, condensed milk, powdered milk, ice cream and fluid milk. The number of persons employed at the plant is 230.

Liquid wastes from the processes result mainly from washing operations, such as cans, bottles, vats, pipes, and pasteurizer washing and floor washings. A large quantity of water is used for cooling purposes in the barometric condenser for condensing milk and in the refrigeration units. Water is obtained from the municipal supply, occasionally a private well being used to supply cooling water.

The refrigeration cooling water and the regeneration water from the water softener are discharged to the storm sewer. All other wastes, including barometric condenser cooling water, are discharged to the sanitary sewer.

(r) Vanadium-Alloys Steel (Canada) Ltd. - Philip Street

This firm fabricates tool and specialty steel bars and forgings.

The wastes discharged may contain small amounts of nitric, hydrofluoric, sulphuric, and muriatic acids, with some potassium permanganate, or may during the dumping of certain tanks containing the above acids used in the pickling process contain large concentrations. It is stated that these acids are siphoned onto the ground at the rear of the building when a tank is to be emptied.

These wastes would be extremely destructive to aquatic life in the river not only because of the low pH values coincident with the discharge of the contents but also due to the toxic constituents. Discolouration of the river water or bed due to the precipitation of the metals previously dissolved during the pickling process might also result.

SUMMARY

The control of pollution with immediate reduction of contamination in the Thames River depends on several steps. The first and most important is an improvement in efficiency of the sewage treatment plants. The second is the control of storm outlet discharges to ensure that only uncontaminated storm water reaches the river. The third involves the minimum flow in the river. This occurs during periods when pollution is most critical and thus dictates in some measure the degree of treatment to be provided.

At present, strong industrial wastes discharged to city sewers either continuously or over a working day period or in batches for short intervals, produce heavy burdens on the sewage treatment processes. Unexpected, strong batches may periodically disrupt efficient operation, sometimes for several days.

A planned program of industrial waste supervision and the requirement of preliminary treatment before discharging to the sanitary sewers is important in the control of the sewage treatment plant loadings. Pre-treatment of industrial wastes will bring a lower and more uniform concentration in the raw sewage flow. A planned, efficient treatment program should then produce an effluent containing less than the 15 p.p.m. Biochemical Oxygen Demand as recommended.

Consideration should be given to the repair and expansion of the South End Sewage Treatment Plant or to its abandonment and the diversion of the flow to either of the two existing sewage treatment plants. The report of James F. MacLaren Associates, Consulting Engineers, January, 1957, on "Storm Relief and Development of Sewerage Systems" recommends that the plant be abandoned and the flow be diverted to the West End Sewage Treatment Plant. When this is done the West End plant will be loaded to its full capacity of 11 M.G.D. This capacity includes the present expansion now nearly completed.

Construction of the West End plant was commenced in 1925, and it has been extended to its present size through four stages of growth. Although most of the equipment and concrete work is in a satisfactory condition, a point has been reached where replacement of some apparatus is advisable. Water wheel equipment, air dispersion piping systems and a clarifier installation are included in this category. In addition to the above-mentioned repairs, other innovations should be considered for more effecttive and economical treatment.

Primary sludge storage tanks at the West End plant are desirable. Use of aeration tanks for this purpose increases maintenance and odor problems, and robs the plant of aeration capacity. This should be carried out promptly.

The volume of wasted sludge now trucked in the liquid state to farmlands is becoming greater as the city grows. The truck haulage and disposal costs are simultaneously increasing as suburbs expand around the city. The present system of disposal has been economical and satisfactory, but in the future, economics may be expected to lend support to an alternative method of more modern type.

The first stage of the East End plant was completed in 1916, to treat a flow of 1 M.G.D. The process used in this original section is not only inefficient and costly by present standards, but after 42 years of constant use, has deteriorated to such an extent that repairs are not practical. It is, therefore, suggested that this section be dismantled and the total flow be passed through the modern activated sludge section.

RECOMMENDATIONS

The conclusions and recommendations based on this survey of stream pollution in the City of London are:

Sewage Treatment Plants:

1. The South End Sewage Treatment plant be abandoned and the flow be diverted to either of the two existing sewage treatment plants.
2. The original section of the East End plant built in 1916 to treat a flow of 1 M.G.D. be dismantled and the total flow be passed through a modern activated sludge section for treatment.
3. A program of sewage treatment plant improvements be undertaken for both the East End and West End plants.
    (a) Immediate minimum projects required to meet OWRC standards:

    Chlorine contact chambers at both the West End plant and the East End plant. Sludge storage facilities at the East End Plant.

(b) Projects recommended for more efficient and economic operation:

East End Plant:

Dismantling of the original Imhoff section.

Alterations to influent channel and to storm clarifier.

Installation of sludge treatment equipment.

West End Plant:

Replacement and repair of aeration piping, water wheels, clarifier and miscellaneous items.

Primary sludge storage tanks.

Installation of sludge treatment equipment.

Sewer Outlets:

1. A planned program of industrial waste supervision be undertaken with the requirement of treatment before discharging to sewers in accordance with the city by-law on sewage and drainage work.
2. Contamination from storm sewer flows be controlled to meet the OWRC objectives for a clean stream.
3. The combined sewer system have a capacity to handle the flow of three times dry weather flow.

Thames River:

1. A minimum flow be maintained in the Thames River consistent with capacities and efficiencies of the sewage treatment plants which will result in coliform organisms not in excess of 2,400 per 100 ml. and an upper limit for B.O.D. (Biochemical Oxygen Demand) of 4 p.p.m. and in general a clear, attractive watercourse.

WATER POLLUTION SURVEY

- County of Middlesex -

Chapter 3

- TOWNS -

This section of the report deals with the investigation of stream pollution in the two towns of Middlesex County.

PARKHILL

1. There is no public sewerage system in Parkhill, and sanitary and industrial wastes must be treated in private sewage disposal systems. It was established that in a number of instances partial or no treatment was given, resulting in sanitary and other wastes being discharged to storm sewers and watercourses within the municipality.

Drainage

The main storm sewers in the town discharge into the Cameron-Gillies open drain which flows from the east end of town in a westerly direction to Parkhill Creek. Several private drains were found to be discharging into the Cameron-Gillies drain. Samples were taken and the results and sampling points are listed as follows:

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
A.P.C 1[illegible].8	EAST LIMIT OF TOWN	2.5	450	17	433	24
P.P.1	OUTFALL - REAR OF P.U.C. OFFICES	43	1326	64	1262	24,000,000+
P.P.2	OUTLET NORTH-WEST OF MAIN ST. BRIDGE (BELIEVED TO BE A PRIVATE DRAIN)	412	2168	152	2016	
P.P.3	ANN ST. STORM OUTLET	187	1666	80	1586	240,000
A.P.C.15.8	NORTH-WEST OF FOUNDRY	52	1220	14	1206	240,000

The above analyses indicate that gross pollution of the Cameron-Gillies drain takes place as it flows through the town.

A storm drain which discharges into an open ditch at the north end of the town, and on the west side of Highway 81 was investigated. Wastes from this drain eventually flow into a tributary of Parkhill Creek. Samples submitted to the laboratory for examination gave these results:

	B.O.D. (ppm)	Solids			Coliform (MPN)
		Total	Susp. (ppm)	Diss.	
P.P.4	19	982	62	920	2,400

Garbage Dump

The municipal refuse dump is well supervised. However, further encroachment towards the local creek might create stream pollution.

INDUSTRIES

Parkhill Creamery

Mr. C.E. Schram, Plant Superintendent, supplied information. The milk plant was recently purchased by the Middlesex Creamery, London. Butter is the chief source of manufacture at the present time. However, a further volume of business is anticipated in other phases of milk processing, in the very near future.

The volume of water used for processing purposes could not be estimated at this time. Wastes resulting from cleansing operations are discharged through a disposal system consisting of three septic tanks, reported to be 12 ft. x 12 ft. x 6 ft. or approximately 900 gallons capacity for each tank. A filter bed is also said to be provided. The effluent is then discharged to the Cameron-Gillies drain. The outlet is located at a bridge near the railroad and approximately in line with the plant. There was no flow at the time of inspection.

SUMMARY FOR PARKHILL

This sanitary survey served to show the extent of the pollution problems in Parkhill. Private sewage disposal units are impractical in instances where private and business properties do not possess adequate land for the installation of these units. Improper connections have been made to storm drains and watercourses. The construction of a public sewerage system should be considered, whereby the sewage and other wastes from the town might be suitably treated before being discharged into a watercourse.

The municipal garbage dump should be carefully supervised to prevent any future pollution of Parkhill Creek as a result of seepage from the dump draining into the stream.

The Parkhill Creamery appears to be the only industry in town with an immediate waste problem. Since an expansion of operations was expected, this will presumably create a greater pollution problem with an increase in the discharge of more plant wastes to the town's storm drainage system. Company officials should provide an efficient method of disposal for plant wastes.

RECOMMENDATIONS FOR PARKHILL

It is recommended that:

1 - An extensive sanitary survey of Parkhill be carried out by municipal officials to eliminate, as far as possible, the objectionable sanitary connections to the storm sewer system.

2 - Consideration be given to the construction of a sanitary sewerage system.

3 - Further dumping of garbage be directed away from

Parkhill Creek.

4 - Officials of the Parkhill Creamery take corrective measures to prevent the pollution of the local watercourse by the discharge of inadequately treated wastes.

STRATHROY

(2) Wastes from domestic and industrial sources in the Town of Strathroy are treated at the municipal sewage plant. However, pollution surveys of the Sydenham River throughout Strathroy indicated that pollution of the stream persists as a result of sanitary and industrial wastes being discharged through the storm sewers and elsewhere.

Sewage Works

The sewerage system serving the Town of Strathroy, consists of separate storm and sanitary sewers followed by a sewage treatment plant to treat the sanitary flow.

Sewage Treatment Plant

The treatment plant consists of a settling tank and sand beds, but the sand beds are only used during the summer months.

Primary Treatment consists of two settling tanks each 21 ft. x 51 ft. 6 inches x 9 ft. water depth. Retention period 1-12 hours on average flow.

Secondary Treatment involves four sand beds:

Each - 100 ft. x 150 ft.
Total area - 60,000 sq. ft.
Rate of filtration - 220,000 gal. per acre per day.

The effluent goes to the Sydenham River. Operating results based on analyses of samples submitted to this Commission, shown in Table B, have not been satisfactory. A number of samples have shown results in excess of 15 parts per million Biochemical Oxygen Demand and Suspended Solids. This has resulted in the contamination of the Sydenham River below the plant effluent sewer.

A by-pass arrangement exists whereby it is possible to discharge raw sewage into the Sydenham River from the Albert Street pumping station, thus by-passing the sewage disposal plant.

A sanitary survey of the municipal storm sewers was carried out to determine the degree of pollution entering the Sydenham River from these sources. The locations of the storm sewer outlets are shown in Fig. 7, and the results of samples obtained at these points are listed.

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	BACT. ANAL. (MPN)	PH	PHEN. (PPB)	ALUMINUM (PPM)
S 1 86.3 EAST FRONT ST.- NO FLOW								
S 2 86.3 ARTHUR ST.- NO FLOW								
S 3 86.2 HEAD ST.- NO FLOW								
S 4 86.1 COLBORNE ST. OUTLET	3	320	26	294	2,400			
S 5 86.0 HIGH SCHOOL DRAIN	0.8	434	8	426	240			
S 6 85.9 CARADOC ST.- NO FLOW								
S 7 85.8 FRANK ST. DRAIN	1.9	320	12	308	240,000			
S 8 85.6 VICTORIA ST. DRAIN	4.1	570	62	508	2,400			
S 9 85.3 ALBERT ST.- EAST SIDE - NO FLOW								
S10 85.3 ALBERT ST.- OUTLET ON WEST SIDE (CONTAINS WASTES FROM VAMCO LTD.)						7.7	13	25
S11 DUKE ST. DRAIN OUTFALL	1.4	310	22	288	240			
S12 85.0 DUKE ST. DRAIN AT RIVER					24,000			
S13 84.5 S.T.P. OUTFALL					2,400,000			

Other storm sewers investigated at this time, did not carry flows.

SYDENHAM RIVER SAMPLES

Samples obtained from the Sydenham River throughout Strathroy repeatedly have given unsatisfactory analyses. At many points in the stream, the results of samples taken have been well above the standards set by the Commission for a clean stream. Results of samples taken during the current survey, together with the location of sampling points, are listed.

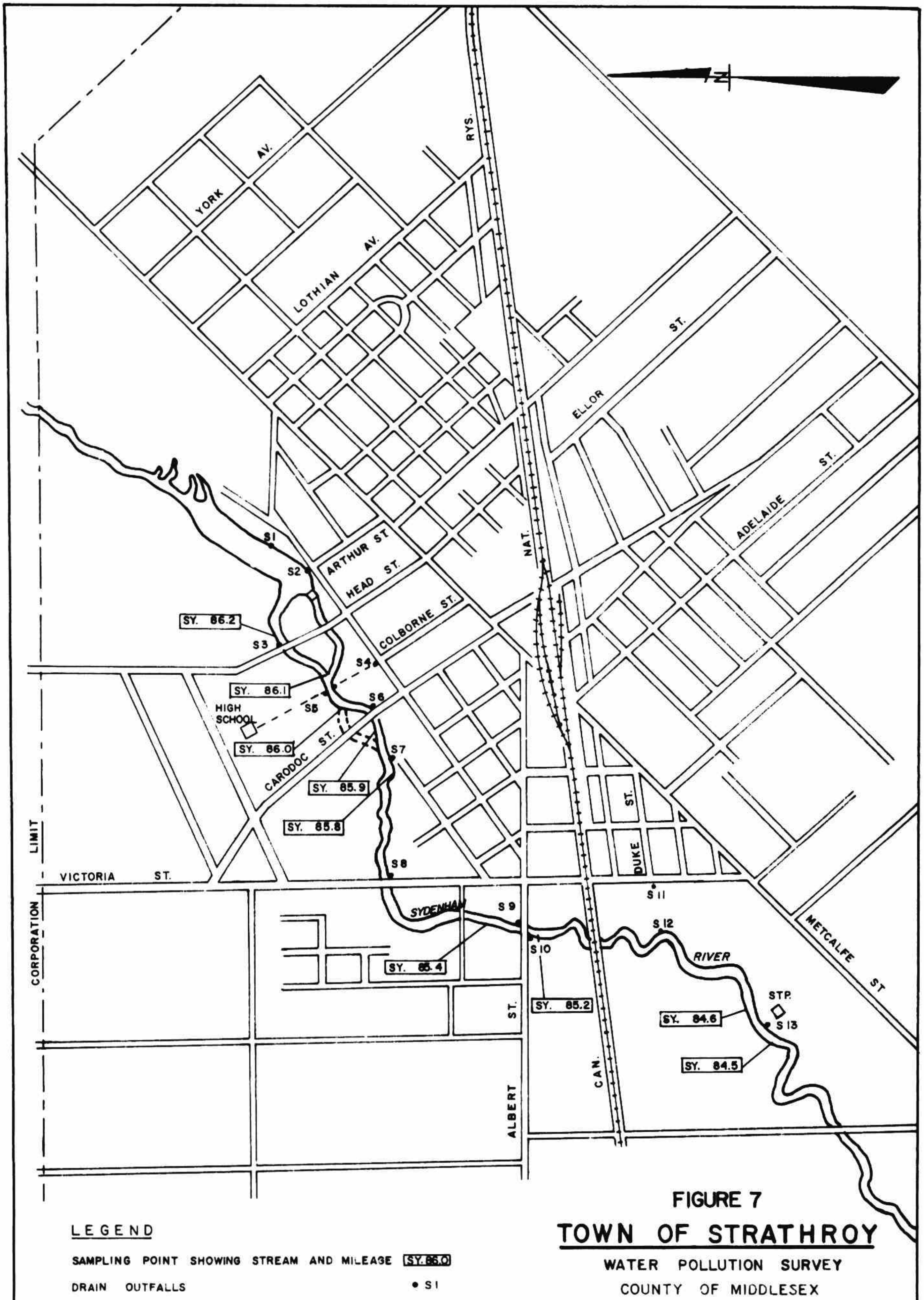


FIGURE 7

TOWN OF STRATHROY

WATER POLLUTION SURVEY
COUNTY OF MIDDLESEX
SCALE: 1" = 1200'

O.W.R.C. TORONTO JUNE 1958 J.R.

SAMPLING POINTS	B.O.D. (PPM)	SOLIDS			COLIFORMS (MPN)
		TOTAL	SUSP. (PPM)	DISS.	
SY 86.2 ABOVE HEAD ST. BRIDGE	1.7	478	30	448	240
SY 86.1 25 YDS. ABOVE COLBORNE ST.					240
SY 86.0 50 YDS. BELOW HIGH SCHOOL DRAIN					2,400
SY 85.9 25 YDS. BELOW CARADOC ST. BRIDGE	1.7	304	44	260	240
SY 85.8 25 YDS. BELOW FRANK ST. BRIDGE					24,000
SY 85.4 50 YDS. ABOVE ALBERT ST. BRIDGE					240
SY 85.2 50 YDS. BELOW " " "					2,400
SY 84.6 25 YDS. ABOVE S.T.P.					24,000
SY 84.5 25 YDS. BELOW S.T.P.					24,000

From the above it can be seen that bacteriological results exceed the standard of 2,400 coliform per 100 ml. by as much as 1,000 times.

INDUSTRIES IN STRATHROY

(A) Vamco Aluminum Products Limited

The Vamco Aluminum plant at Strathroy employs 26 persons and produces custom aluminum windows, aluminum panel walls, steel shelving, and distributes refrigeration units supplied by the parent firm Valley Metal Products.

The industrial wastes from the plant at Strathroy result from the dumping of two 2,000 gallon tanks used for etching and de-smutting. These tanks are dumped at infrequent intervals. In two years of operation the company has dumped each reagent tank only once. The regular schedule provides dumping once or twice each year.

The etching tank solution is composed of 2,000 gallons of 5% Pennsalt Cleaner AE16. A sample of the dry reagent used for making up the etching solution was obtained for analysis. The results indicated the chemical contained 80% hydroxide alkalinity as NaOH.

The de-smut tank also has a capacity of 2,000 gallons. Sixteen ounces per gallon of Pennsalt Aldox reagent is used to make up the solution. A sample of the dry Aldox reagent

TABLE 8

TOWN OF STRATHROY SEWAGE TREATMENT PLANT

ONTARIO WATER RESOURCES COMMISSION ANALYSES

DATE	B. O. D.			TOTAL SOLIDS PPM			SUSPENDED SOLIDS PPM			DISSOLVED SOLIDS PPM			PERCENT REDUCTION			
	RAW	INT.	EFFL.	RAW	INT.	EFFL.	RAW	INT.	EFFL.	RAW	INT.	EFFL.	B.O.D.	TOT. SOL.	SUSP. SOL.	DISS. SOL.
APR. 4/55	79		41	610		540	102		54	508		486	48	12	47	5
JAN. 22/57	65		118	526		464	46		8	480		456		12	83	5
AUG. 15/57	202		10	892		508	210		2	682		578	95	35	99	15
SEPT. 19/57	194		29	618		690	168		144	450		546	85		15	
OCT. 22/57	352		16	900		506	300		32	600		474	95	44	89	21
NOV. 28/57	19	17	80	432	560	574	28	70	94	404	490	480				
JAN. 16/58	121	65	57	612	530	500	152	40	30	460	490	470	53	18	80	
FEB. 25/58	1040	105	101	2560	718	706	1890	44	96	670	674	610	90	72	95	9
MAR. 19/58	44	140	104	466	612	606	22	88	60	444	528	546				
APR. 17/58	52	167	146	446	662	716	22	122	170	424	540	546				
JUNE 6/58	338	276	228	1062	686	500	336	158	56	726	528	444	32	53	83	39

NOTE: THESE FIGURES ARE FOR THOSE DATES ON WHICH "RAW" AND "EFFLUENT" DATA ARE AVAILABLE. WHERE NO "PERCENT REDUCTION" IS INDICATED, THERE IS A GAIN RATHER THAN A REDUCTION.

OWRC. SEPTEMBER 1958. J.H.

provided by the company analyzed 3.9% chromium as Cr and 32% acidity as CaCo3.

The method of disposal of the waste solutions is to pump the contents of the tanks to a sump 30 feet long by 5 feet wide by 2 feet deep, located in a large vacant lot behind the plant. The alkaline cleaner when mixed with the Aldox solution causes the chromium to precipitate. The supernatant liquor evaporates or soaks into the soil. There are no creeks or open ditches in the vicinity. The sump should provide suitable disposal for the volume of waste it is proposed to handle.

At the time of the survey a waste discharge from the plant was observed at the new storm drain located on the west side of Albert Street. Analysis of the waste is indicated in sewer outlet sample No. 5.

(B) Canadian Canners

This plant processes corn, peas, and beans for the period from June to October approximately.

It was estimated that 500,000 gallons of water is used per day. The treatment consists of screening and discharging to a storm sewer, which flows into an open ditch with an outlet at the Sydenham River. Waste disposal at this plant consists only of primary treatment. The waste, after solids separation is discharged to the Sydenham River creating serious pollution at this point.

SUMMARY FOR STRATHROY

Investigations on pollution carried out on the Sydenham River throughout Strathroy, have indicated substantial pollution. The analyses of river water taken within the town limits gave B.O.D. figures in excess of the recommended 4 p.p.m., and bacteriological results above the 2,400 M.P.N. per 100 ml. standard. This condition results from industrial, municipal and private sewage discharges.

The municipal sewage treatment plant does not provide a satisfactory effluent of 15 p.p.m. in B.O.D.

Heavy pollution exists in the vicinity of certain storm sewer outlets. This is particularly obvious at the Duke Street drain which receives wastes from the Canadian Canners plant during plant operation. Pollution is quite heavy in the vicinity of the sewage treatment plant outfall.

Immediate steps should be taken to improve the standard of waste treatment at the municipal sewage treatment plant and at the canning factory.

RECOMMENDATIONS FOR STRATHROY

1 - The operation of the sewage treatment plant be improved to meet OWRC effluent standards of 15 parts per million B.O.D. and Suspended Solids.

2 - Standards of 4 parts per million B.O.D. and 2,400 coliform organisms per 100 ml., be maintained in the Sydenham River throughout and below the town.

3 - Industrial wastes be given complete treatment before being discharged to the river.

4 - Contamination of storm sewer flows be prevented in order to meet OWRC objectives for a clean stream.

WATER POLLUTION SURVEY

- County of Middlesex -

Chapter 4

- VILLAGES -

This part of the report reviews stream pollution in the villages of Middlesex County - Ailsa Craig, Glencoe, Lucan, Newbury and Wardsville.

(1) AILSA CRAIG

All potential sources of pollution in the village were investigated. These included two municipal drains, a refuse dump and a dairy.

Drainage

Samples obtained from two storm drain outlets, and points on the Ausable River gave analyses as follows:

SAMPLING POINT	LOCATION	B.O.D. (PPM)	SOLIDS (PPM) TOTAL	SOLIDS (PPM) SUSP.	SOLIDS (PPM) DISS.	COLIFORM (MPN)
A.A. 1	DRAIN OUTLET AT DEPARTMENT OF HIGHWAYS' YARD	75	664	84	580	240,000
A.A. 2	STORM OUTLET-WEST END OF VILLAGE AT RAILWAY TRACKS	5.2	606	2	604	24 MEMBRANE FILTER COLIFORM COUNTS PER 100 ML.
A.58.7	AUSABLE RIVER ABOVE VILLAGE	3.0	278	18	260	84,000
A.56.5	AUSABLE RIVER BELOW VILLAGE	6.8	256	14	242	5,000

The results of the sample taken at the outfall of the drain on the Department of Highways' property showed heavy pollution.

Refuse Dump

An investigation was made of a refuse dump located on the west side of the village in close proximity to a sawmill. Garbage had been dumped into a nearby ravine. There was a slight flow observed from this ravine, and samples taken at its outlet to the river gave these analyses:

B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
1.6	700	16	684	2,400,000

Recommendation

Action should be taken to locate and eliminate all private connections to surface water drains which in any way contribute to the pollution of the watercourse.

(2) GLENCOE

The village depends on private systems for the disposal of domestic and industrial wastes. A sanitary survey of the municipality revealed that a large percentage of these private units was connected to the village storm drains. The installation of septic tanks and field tile disposal systems is now supervised by village officials. Under a new by-law private sewage disposal units must meet a minimum standard. This is essential to prevent stream pollution.

Drainage - The village storm sewers discharge into two open drains.

Parkhouse Road Drain

Wastes from the south section of Glencoe are discharged into this drain. Samples taken at Parkhouse Road for sanitary analyses gave results as follows:

SAMPLING POINTS	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	PH	PHENOL (PPB)	CYANIDES (PPM)	COLIFORMS (MPN)
GL. 1	2.4	716	14	702	7.4	8	0	240,000

Elizabeth Street Drain

This storm sewer discharges into an open drain at the north-east side of the railroad on the main village street. Several drains were also discharging into the watercourse in this area. A physical examination of the flow indicated the presence of domestic and industrial wastes. Samples were submitted to the Commission's laboratory for chemical and bacteriological analyses as follows:

			SOLIDS					
SAMPLING POINT	B.O.D. (PPM)	TOTAL	SUSP. (PPM)	DISS.	PH	PHENOL (PPB)	CYANIDES (PPM)	COLIFORMS (MPN)
GL. 2	129	812	126	686	6.7	8	0.7	24,000

These results are indicative of gross pollution.

INDUSTRIES

Glencoe Creamery

Mr. E. Tate, owner of the creamery, was interviewed. The plant is engaged in the making of butter products.

Disposal of Wastes

The volume of municipal water used was given as approximately 4,000 gallons per month. Water used for cleansing purposes is discharged through septic tanks and field tile, and the final effluent flows into the municipal storm sewer.

Local authorities should further investigate the disposal of wastes from this plant. Disposal of inadequately treated plant wastes into the municipal storm water system can not be permitted.

National Tubular Products Limited

Automotive and agricultural implements are manufactured at this plant. Mr. L. Locke, Foreman, was interviewed.

Disposal of Wastes

Volume of municipal water used was given at approximately 12,000 gallons per month. There is no industrial waste involved. A septic tank and field tile disposal system is employed for the disposal of sanitary wastes. A plant drain has an outlet at the Elizabeth Street drain. There was no flow during the inspection.

The septic tank system should be inspected to ensure against possible connections to any watercourse.

Highland Dairy

Mr. L.F. Pole, is the owner of this milk pasteurization plant. It is engaged in the manufacture of pasteurized milk products.

Disposal of Wastes

Plant wastes are discharged through a septic tank into a public storm sewer.

The amount of municipal water used was estimated at 70,000 gallons per month.

The dairy plant is obviously contributing to the pollution problem of the village by the discharge of milk wastes.

Forest City Knitting Company Limited

This firm is employed in the manufacture of hosiery, etc. Mr. H. Lotan, Plant Foreman, was interviewed. Dyes, oil and washing compounds are not used as is customary in plants engaged in this particular work.

Disposal of Wastes

Sanitary wastes are discharged through four septic tanks and a field tile disposal system. It was reported that the effluent might eventually drain into the municipal sewer.

The plant uses approximately 25,000 gallons of water per month.

Clark Brothers Abattoir

Mr. H. Diamond, Plant Foreman, was interviewed in the absence of Manager, R. Clark.

Operation

The plant is engaged in slaughtering animals and the preparation of meat for human consumption.

Disposal of Wastes

A private water supply is available, but the volume used could not be ascertained at this time.

Heavier solids are removed to a fertilizer plant. Other wastes are discharged to a septic tank and field tile bed with the effluent going to an open ditch. Blood was evident in the drainage from the slaughterhouse and stock pens. Plant wastes eventually flow into Newbiggen Creek.

Sampling

Samples were obtained of the plant wastes in the vicinity of the drain outlet with the following analytical results:

SAMPLING POINT	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
GL. 3	800	1125	248	878	240,000

As the results indicate, the wastes discharged from this abattoir create a serious source of pollution. An approved method for the efficient disposal of plant wastes should be introduced without delay.

SUMMARY FOR GLENCOE

The treatment of sanitary wastes at Glencoe is provided by private septic tank and field tile disposal systems. The volume of the wastes for disposal has been increased measurably by the water services from the municipal water system.

The two main drainage outlets from the village are contaminated by sanitary and industrial wastes. This contamination results from the unsatisfactory types of private sewerage systems and industrial waste treatment systems. Immediate and direct steps should be taken by municipal officials to remedy this situation. This can be done by providing individual treatment systems to serve each residence and industry, thus eliminating sanitary drain connections to surface water drains. Another course of action, and the most desirable, would be the installation of a sewerage system which would provide for the treatment of sanitary and industrial flows before discharging to a watercourse.

RECOMMENDATIONS FOR GLENCOE

1 - A survey be conducted by municipal officials to locate and eliminate all connections carrying sanitary or industrial wastes to surface water drains.

2 - Consideration be given as an alternative method for the treatment of wastes to initiating a sewerage works programme.

(3) LUCAN

Drainage

There are two storm drains in the village. An open drain flows from the east end of the municipality to the north-west section, and discharges into the Little Ausable River. A closed drain flows under the open drain, and discharges at the north-end of Stanley Street. Samples were obtained for chemical analyses:

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
LU. 1	OPEN DRAIN	19	583	18	570	--
LU. 2	CLOSED DRAIN AT OUTLET	64	666	44	622	--

These results indicate that domestic wastes were being discharged into the municipal drains from private homes and business premises.

A sample was obtained at the junction of Little Ausable River and the drain from Lucan. The analyses are as follows:

B.O.D. (ppm)	Solids Total	Susp. (ppm)	Diss.	Coliforms (MPN)
1.3	380	14	366	24

INDUSTRIES

Hearn's Dairy - Lucan

Mr. Ivan Hearn, owner, was interviewed.

Disposal of Wastes

The volume of municipal water used for plant operations could not be ascertained at this time. Approximately, 1,000 lbs. of milk is received at the dairy each day for processing pasteurized milk products. Plant wastes are discharged through a three-chambered septic tank, having an approximate capacity of 700 gallons, The effluent goes direct to the municipal drain.

The present system for the disposal of plant wastes is not satisfactory. A more effective system of waste disposal should be introduced which will prevent stream pollution.

SUMMARY FOR LUCAN

The disposal of sanitary wastes in Lucan is carried out by means of private septic tanks and field tile disposal systems. The volume of wastes for treatment is increased by the municipal water system in comparison with communities not having public supplies.

The information gathered in the village is sufficient to show that domestic and trade wastes are being discharged into storm drains. Action is required by local officials to eliminate all connections carrying these wastes to surface water drains.

RECOMMENDATIONS FOR LUCAN

1 - A survey be carried out by municipal officials to locate and disconnect all sanitary and industrial waste connections to surface water drains.

2 - Consideration be given to the installation of sewerage works to serve the village.

(4) NEWBURY

During a sanitary survey of the village, all known storm drains were located and several samples obtained to determine the extent of pollution.

All the drainage from Newbury flows into Haggerty Creek which discharges into the Sydenham River. These are the analyses of samples taken at the different sampling points:

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SUSP. (PPM)	DISS.	COLIFORMS (MPN)
NY. 1	DOLBY DRAIN OUTLET	22	914	74	840	2,400
NY. 2	ROBINSON DRAIN - AT HWY.	3.5	560	24	536	24,000
NY. 3	DUNDAS ST. - STORM OUTLET	0.8	938	32	806	2,400,000
NY. 4	HAGGERTY CREEK - ABOVE DUNDAS OUTLET	3.0	592	40	552	24,000
NY. 5	HAGGERTY CREEK - BELOW DUNDAS OUTLET	2.2	518	10	508	24,000

SUMMARY FOR NEWBURY

Sewage treatment for the village is provided by private septic tanks and field tile disposal systems.

Laboratory results show varying degrees of pollution, and they establish the fact that private premises are discharging household wastes into the surface water. These drains have as outlets the streams which are part of the Sydenham River watershed. This results in pollution of the surface drains in the area of Newbury. Property owners in the village have been advised by their Council to take corrective measures to eliminate the possibility of domestic wastes being discharged into the storm drains.

RECOMMENDATIONS FOR NEWBURY

1 - The program of locating and eliminating private sanitary sewer connections to surface water drains be continued until contamination of the watercourse is corrected.

(5) WARDSVILLE

Sources of Pollution in the Village of Wardsville were investigated. Samples were taken at the various storm sewer outlets, and the resulting analyses together with the respective sampling points are listed herewith:

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS			COLIFORMS (MPN)
			TOTAL	SUSP. (PPM)	DISS.	
WD. 1	HAGGERTY ST. DRAIN OUTLET - 150 YDS. FROM THAMES RIVER	360	1926	1170	756	240,000
WD. 2	STORM SEWER AT HWY. #2 - EAST END OF VILLAGE	5.8	624	20	604	24,000,000+
WD. 3	DAVIS ST. DRAIN OUTLET - 75 YDS. FROM THAMES RIVER	18	642	26	618	240,000
WD. 4	MUNICIPAL DRAIN AT RIVER - WEST SIDE OF HAGGERTY ST.	88	710	24	686	24,000,000+
WD. 5	CREEK NEAR CEMETERY	1.3	380	18	362	240,000

The results of bacteriological and sanitary chemical analyses indicate gross pollution of surface water drains within the village. Contamination of the drains results in the pollution of the Thames River which receives the surface water flow from the area.

SUMMARY FOR WARDSVILLE

The disposal of sanitary wastes in Wardsville is by means of private septic tank and field tile disposal systems. The volume of wastes from these systems is increased by the several private water supply systems and the apparent high capacity of local wells.

As indicated by the analyses, an undesirable pollution condition exists which results in contamination of the Thames River at the southern boundary of the village. The private sewage disposal systems are either improperly installed, or lack the continuous supervision required to maintain minimum sanitary standards. It will be necessary for municipal officials to investigate private sewage disposal systems and correct any systems that are not operating in accordance with these standards or are illegally connected to surface water drains.

RECOMMENDATION FOR WARDSVILLE

1 - A survey be carried out by municipal officials to locate and eliminate all sanitary sewer connections tc surface water drains.

WATER POLLUTION SURVEY

- County of Middlesex -

Chapter 5

-TOWNSHIPS-

This chapter of the report deals with stream pollution in the Townships of Middlesex County.

(1) ADELAIDE TOWNSHIP

The main area of pollution in the Township of Adelaide was centered around Kerwood.

Kerwood Police Village

There are two sources of water pollution in this police village, namely, the Carnation Company's milk receiving plant, and the municipal storm drain. Drainage from Kerwood is discharged into Spring Creek, and eventually into the Sydenham River.

Carnation Company's Plant

The method of waste disposal was reviewed with Manager M.E. Brookes.

The plant receives a maximum of 160,000 lbs. of milk per day. This is shipped to another plant for processing.

Disposal of Wastes

There is a scarcity of water in this area with the result that 5,000 gallons per day is shipped from the Company's plant in Aylmer. This, together with a private well supply, provides the plant with the necessary amount of water.

The wastes from the plant are of three kinds, namely:

1 - washings from the cans, floors, holding tanks and incidental equipment,

2 - sanitary domestic wastes, and

3 - cooling water.

The first two are discharged to a septic tank and recirculating trickling filter. The colling water by-passes the treatment units and is discharged to the land drain carrying the treated effluent to the open Kerwood drain.

Sampling

Samples were obtained from the waste treatment plant and the effluent discharge at the Kerwood drain. This was used to determine the efficiency of the present system.

The following analytical results are listed herewith from the samples collected:

B.O.D. (PPM)	SOLIDS			COLIFORMS (MPN)	LOCATION
	TOTAL	SUSP. (PPM)	DISS.		
248	1070	154	916	24	WASTES BEFORE TREATMENT
114	834	32	852	240	AFTER AERATION
636	986	222	764	2,400	FINAL EFFLUENT
53	906	54	852	24,000	KI PLANT WASTES DISCHARGE AT KERWOOD DRAIN

These analyses indicate that the treatment of plant wastes is not very satisfactory, particularly so when the final effluent from the plant's treatment system indicated poorer quality than the untreated or raw wastes.

The Carnation Company should give immediate consideration to improving the present methods employed in waste treatment. It might be advisable to consider the installation of a spray irrigation system as one method. There appeared to be sufficient land available for this purpose.

Kerwood Municipal Drain

The municipal storm drain outfall is located at the Kerwood drain approximately 20 yds. east of the Carnation Company drain. A sample of the effluent was submitted to the Commission's laboratory for chemical analysis:

	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
K2	---	616	16	600	2,400,000 plus

It is apparent that discharges from domestic and industrial premises in the area also result in pollution of the Kerwood drain.

Summary for Kerwood

The residences of the village have private septic tank and field tile disposal systems for sewage treatment. However, investigations carried out for several years have shown contamination in two surface water drains that discharge into the Kerwood drain. The major pollution results from wastes discharged at the Carnation plant.

The Carnation plant waste treatment system has not given adequate purification, with the result that this partially treated waste, as well as domestic sewage, is being discharged into the watercourse.

The remaining township area appeared to be relatively free of pollution conditions.

Recommendations for Kerwood

1 - Satisfactory treatment be provided for wastes discharged from the Carnation Milk plant.

2 - A survey be made of private septic tank and field tile disposal systems in the village to eliminate any sanitary sewer connections to storm water drains.

(2) BIDDULPH TOWNSHIP

A sanitary survey of Biddulph Township revealed that pollution problems existed in Lucan and district.

Hardy Slaughter-House - Lucan

This slaughter-house is located approximately one-half mile west of the Village of Lucan on Highway 4. Mr. C, Hardy, owner, supplied information relative to the disposal of plant wastes.

It was reported that as an average 12 beef cattle are slaughtered weekly.

Disposal of Wastes

Offal is forwarded to a fertilizer company, and blood wastes are used on the land as fertilizer. Other plant wastes are discharged through a floor drain to a catch basin, and finally through a field tile disposal system. There was some evidence of a discharge from the field tile approximately 100 yards from a creek which carries the drainage from Lucan. The plant was not in operation at this time.

Slaughtering of animals is normally carried on once weekly. It is necessary to visit this plant again when operations can be observed and a survey made to ascertain if wastes are being discharged through the field tile disposal system into the watercourse.

Refuse Dump

A garbage dump located 150 yards from the Little Ausable River, on the north-side of Highway 4 was investigated.

It is recommended that the dump should be covered over with clean earth and compacted. No further encroachment to the river should be permitted.

Summary for Biddulph

Generally in the Township of Biddulph water pollution is not a problem. However, the investigation indicated that contamination of watercourses may arise from the operation of the Hardy Slaughter-House and the refuse dump located north of Lucan on the north side of Highway 4.

Recommendations for Biddulph

1 - The refuse dump operated in the Township be regularly compacted and covered with earth. It is also suggested that further encroachment to the river be avoided.

2 - The waste disposal system of the Hardy Slaughter-House be observed during operation to ensure that no wastes are discharged to any watercourse.

(3) CARADOC TOWNSHIP

Caradoc Township, a rural area, has the Police Village of Mount Brydges and several hamlets, Christina, Longwood, Muncey and Caradoc within its boundaries.

Pollution conditions were investigated throughout the township with particular attention being given to Muncey and Mount Brydges and area.

Mount Brydges

A survey of sanitary conditions in this police village included the sampling of the main storm drain. The Bice drain flows north on the west side of the main street and discharges into the Lipsit drain. Analytical results of the samples obtained are as follows:-

	Solids				
B.O.D. (ppm)	Total	Susp. (ppm)	Diss.	Coliforms (MPN)	Location
2.6	394	6	388	2,400,000	CT1 Lipsit drain

The bacteriological analysis of this sample from the Lipsit drain indicates gross contamination.

Hedley's Slaughter-house - Mount Brydges

Mr. Allan Hedley, owner, supplied the following information relative to plant operations. The plant is employed in the killing of animals for human consumption. Approximately thirty-five animals are slaughtered weekly.

Offal and heavier wastes are sent to a fertilizer plant for final disposal. Other wastes are discharged through a floor drain to a ravine, and consequently to a creek. The creek discharges into the Thames River at a point one and one-quarter miles east of the plant. The plant was not operating at the time of this visit, and consequently no samples were obtained.

The present system of waste disposal is not satisfactory, and it is recommended that a septic tank of adequate capacity together with a field tile distribution system be installed.

No other pollution conditions were found in the township.

Muncey

A sample was obtained from a creek at Muncey, on the Indian Reservation. The analyses are as follows:

B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)	Location
2.9	468	62	406	24,000	CT 2

The bacteriological results indicate pollution.

Summary for Caradoc Township

The disposal of sewage is accomplished by means of septic tank systems. Pollution in the township is confined to areas of small population concentrations.

Soil conditions in the area of Mount Brydges are excellent for sewage systems of the septic tank type. However, evidence has been obtained of contamination of surface water drains and sewers in the village due to the discharge of wastes from inadequately installed systems, and in a few instances, of direct discharges of untreated sewage.

A similar condition exists at Muncey. A slaughter-house located close to Mount Brydges presents a waste treatment problem. An adequate waste disposal system is required to treat fully the discharge from this operation.

Recommendations for Caradoc Township

1 - Septic tank and field tile disposal systems be installed in the populated areas of the township and in particular in the Police Village of Mount Brydges and the hamlet of Muncey.

2 - An adequate system of waste disposal be provided for the Hedley Slaughter-house.

(4) DELAWARE TOWNSHIP

The Township of Delaware which is largely a rural area is influenced by its proximity to the developed urbanized areas of Westminster and London Townships. Whereas the population is not concentrated, it is not as sparsely distributed as other rural areas.

The small population concentrations are centered around the Police Village of Delaware and east toward the boundary townships of the City of London.

The surface of the township is composed mostly of lacustrine clays which are covered in a few areas, chiefly adjacent to the Thames River, with patches of deltoic sands.

There is a great variety in well conditions throughout the township. Good drilled wells have been developed at depths ranging from 16 feet to over 300 feet. Capacities vary from small quantities to high capacity municipal wells. Bedrock wells have usually contained objectionable amounts of hydrogen sulphide in the water. The drilled wells average from 160 to 200 feet in depth.

Water supply in the township is provided by private wells located at each place of residence and the commercial establishments.

Sewage treatment is accomplished by individual septic tank and field tile disposal systems at the homes and commercial buildings.

DELAWARE

Delaware, a Police Village, has no municipal water supply. The water for domestic use is obtained from private wells located close to the homes and other buildings.

At least one developed water system, Tunk's Water Supply, is in use in the village. This system obtains water from a shallow well which provides an adequate volume of good quality water to several homes.

Sewage treatment is provided at each home by means of septic tank and field tile disposal systems constructed under the supervision of local health authorities.

The most influencing factor in the community is the Thames River which flows past the western boundary of the village. The river is heavily polluted in the City of London area and is in a recovery state in the vicinity of Delaware. Pollution levels in the river at Delaware vary with the flow. In addition, some sanitary wastes are discharged into the river from surface water drains in the village.

Although the amount of pollution in the Thames River at Delaware is low during most of the year, the effect of pollution is noticeable.

Summary

The Thames River as it flows through the Township of Delaware is the zone of recovery. The river begins to stabilize and purify itself to a normal condition. However, during the dry weather period when the flow is low, the effect of pollution received from the urbane area is observed farther downstream.

The discharge of contaminated surface water from populated areas such as Delaware and even small hamlets within the watershed delay the natural process of recovery in the river.

(5) DORCHESTER NORTH TOWNSHIP

Dorchester North Township with the exceptions of the Police Village of Dorchester and the hamlets of Crampton, Harrietsville, Mosely, Putnam and Nilestown, is entirely rural.

Sampling of the storm sewer outlets gave the following analytical results:

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
ND 1 JANE ST., STORM OUTFALL	8.4	612	16	596	24,000,000 PLUS
ND 2 OPEN DRAIN, 25 YDS. WEST OF JANE ST.	1.2	484	14	470	240
ND 3 STORM OUTLET S.W. SIDE OF BRIDGE	520	1424	1279	146	24,000,000 PLUS
ND 4 STORM OUTLET N.W. SIDE OF BRIDGE	1.5	388	378	10	2,400
ND 5 STORM OUTLET N.E. SIDE OF BRIDGE	NO FLOW				

Other drains investigated did not carry any flow at this time. The laboratory results on samples taken at the village storm sewer outlets indicate that heavy pollution was present resulting from direct connections from private homes to the storm drains. At the storm outlet on the southwest side of Dorchester bridge, a considerable amount of sewage was visible, accompanied by a particularly offensive odour.

Certain industries near the village were investigated as follows:

INDUSTRIES

Brookes Brothers - Butchers

This plant is engaged chiefly in the slaughtering of animals. Approximately 15 animals are killed weekly. The plant wastes are removed to a fertilizer plant. Wastes from cleansing operations are discharged to a septic tank having an approximate capacity of 450 gallons. It is complete with a field tile bed said to consist of 300 feet of drainage tiles. There was evidence of wastes being discharged through an open tile and down the side of a hill towards Dorchester pond. The latter is approximately seventy-five yards from the plant. There was no discharge at the time of this visit. There is adequate space in the vicinity of the slaughter-house for additional field tiles. It was recommended that an extension be carried out to the open tile and directed away from the Dorchester pond. This would provide a suitable system of waste disposal providing that operations do not increase beyond the plant capacity.

Union Cheese Factory

This cheese factory is located two miles north of the village. The method of waste disposal was reviewed with the owner Mr. S. McCartney.

Disposal of Wastes

A private well supplies water for this plant, but the volume used could not be estimated. Whey from cheese manufacturing is returned to the producers. Other wastes were discharged through a floor drain into a three compartment septic tank. The effluent from the septic tank flows through a field tile into a catch basin approximately 200 yards south of the cheese factory. Two drains used for the drainage of farmland were discharging into the catch-basin. The wastes from the catch-basin flow through a tile and into a ditch which empties into a creek on the Mitchell farmland.

An outside privy was employed for the disposal of sanitary wastes.

Sampling

Samples were taken from the factory drain outfall at the catch-basin. The resulting analytical results are as follows:

B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
1120	1628	184	1444	24,000,000 PLUS

An effort should be made to prevent plant wastes from being discharged into the watercourse.

Nilestown

Samples were obtained from the two municipal storm drains located one-half mile south of Nilestown on the south-east side of Highway 74. The results were as follows:

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
NO. 6 STORM OUTLET	14	1712	14	1698	240,000
NO. 7 STORM OUTLET	28	594	14	580	24,000,000 PLUS

Further samples were obtained from the receiving stream at a point approximately three-quarters of a mile from its junction with the Thames River, south branch, and approximately one-half mile from the storm sewer outlets. The analyses are as follows:

B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Membrane Filter Coliforms Count per 100 ml.
7.0	370	16	354	150,000 plus

The results of samples taken at Nilestown indicate that sanitary wastes were present in the storm sewers. The sample taken at the receiving stream was above the acceptable standard of 4 p.p.m. B.O.D. for a stream.

Township officials should make every effort to prevent domestic wastes from dwellings being discharged into the stream through municipal or private drains.

Aylmer Packers - Belmont

The method employed for the disposal of plant wastes was discussed with the owner, Mr. N.P. Olson.

Operations

Approximately two hundred and fifty hogs per week are killed and prepared for marketing.

Disposal of Wastes

Blood wastes are drained into barrels and forwarded with offal, and many other solid wastes, to a fertilizer plant. Floor washings drain into a catch-basin and then to a two-compartment settling tank. From this point, the wastes enter a three-compartment septic tank said to be complete with a field tile disposal system. Mr. Olson reported that the field tile disposal system was under-drained through a gravel bed. However, the effluent from the treatment system was discharging into a drainage course. In the vicinity of the railway tracks ponding occurred, and the wastes ran under the railway road bed and entered a field tile on the property of Mr. B. Rath. The discharge from this tile empties into a swamp area approximately three quarters of a mile from the plant. Water from this area accumulates to form a tributary of Kettle Creek.

It was also noted that domestic wastes from one or two private dwellings were discharged to the same drainage course in the vicinity of the railway tracks.

Sampling

Analytical results.

		SOLIDS			
LOCATION	B.O.D. (PPM)	TOTAL	SUSP. (PPM)	DISS.	COLIFORMS (MPN)
DRAIN OUTLET NEAR RAILROAD	3550	4218	1020	3198	24,000,000 PLUS
3/4 MILE N.E. OF PLANT	78	534	26	508	
JUNCTION WITH KETTLE CREEK	1.2	462	36	424	

The present system of waste treatment at the Aylmer Packer's plant is unsatisfactory. An approved treatment system should be provided without delay.

Local officials should take steps to eliminate connections from private homes to the watercourse at Gladstone.

Borden Company - Harrietsville

Approximately 40,000 to 60,000 lbs. of milk per day is received at this plant. It is then said to be shipped to other company plants for processing. Mr. Max Frost, Manager of the plant, was interviewed at the time of this visit.

Disposal of Wastes

The volume of water used for cleaning and cooling operations could not be ascertained. Wastes resulting from washing and cooling operations were discharged into a catch-basin having an approximate capacity of 600 gallons and through a drain into a ditch. A closed drain carries the wastes in an easterly direction. The drain then discharges near a wooded area and finally into Kettle Creek.

Samples were obtained of the plant wastes at the outfall. The analyses were as follows:

B.O.D. (ppm)	Solids Total (ppm)	Solids Susp. (ppm)	Solids Diss. (ppm)	Coliforms (MPN)
374	1166	552	614	24,000,000 plus

The present system of waste disposal from this plant is entirely unsatisfactory. It is recommended that consideration be given to the introduction of spray irrigation for waste disposal.

Refuse Dumps

Two refuse dumps in Dorchester North Township were investigated due to their proximity to a watercourse.

A serious condition existed at the township dump located two miles east of Harrietsville on the north-west side of Whittaker Lake. The lake is the source of Kettle Creek. At the time of this inspection the garbage was approximately 50 yards from the water-line. However, a considerable amount of refuse had been indiscriminantly dumped at the bridge on the north-end of the lake. Every effort should be made to clear up this area and to prevent any dumping whatsoever in Whittaker Lake. It is recommended that further dumping of refuse at the present site should be discontinued, and that the present dump be covered with clean earth.

Samples were taken in the vicinity of Whittaker Lake, and the sampling points and analyses are as follows:

		SOLIDS			
LOCATION	B.O.D. (PPM)	TOTAL	SUSP. (PPM)	DISS.	COLIFORMS (MPN)
BRIDGE-NORTH END OF WHITTAKER LAKE	2.4	248	30	218	2,400
SOUTH END OF WHITTAKER LAKE	2.5	206	18	188	2,400
CREEK - 1 MILE SOUTH OF LAKE	2.4	294	36	258	240

Another refuse dump on the 2nd concession of Dorchester North Township was investigated. It was found that refuse was being dumped into a ravine, which is the water source of a tributary of Dingman Creek. Refuse dumps should be located a considerable distance from a watercourse to prevent any pollution of the stream. It is also suggested that sanitary landfill be employed, and that the refuse be covered regularly. Samples were taken from the tributary of Dingman Creek, at Highway 74, and the following analytical results are listed:

	Solids			
B.O.D. (ppm)	Total	Susp. (ppm)	Diss.	Coliforms (MPN)
4.2	228	26	202	2,400

CRUMLIN

Samples were taken at a township open drain in the Crumlin area, and which discharges into the Waubuno Creek. Township officials had received complaints of sewage odours in the vicinity of this watercourse.

		Solids			
Location	B.O.D. (ppm)	Total	Susp. (ppm)	Diss.	Coliforms (MPN)
ND 8	4.8	468	110	358	24,000

The bacteriological analysis of the sample indicated contamination of the drain.

Summary

Pollution of the Thames River and watershed in the

Township of North Dorchester is not widespread. The level of pollution is low and is confined to the sections of the river at Dorchester and Nilestown. This pollution originates from private sewer connections to surface water drains which have as their outlets the Thames River.

The four industries investigated in the township, Brookes Brothers Slaughter-house, Union Cheese Factory, Aylmer Packers and the Borden Company plant are all discharging untreated or partially treated waste to watercourses. The results of samples indicate heavy pollution which will create odour and nuisance problems as well as reducing the quality of water in these streams.

The investigation of the two refuse dumps indicated that contaminated surface drainage is being discharged into Whittaker Lake and Dingman Creek. The location of these dumps is most undesirable and should be moved to sites that will not affect the watercourses.

Recommendations for Dorchester North

1 - A survey be carried out of storm sewers by local officials of the municipalities of Dorchester and Nilestown, and all private sanitary connections to these drains be disconnected.

2 - Adequate treatment of industrial wastes be provided at the Brookes Brothers Slaughter-house, Union Cheese Factory, Aylmer Packers and the Borden Company plant.

3 - The two refuse dumps investigated be removed to suitable sites.

(6) EKFRID TOWNSHIP

The Township of Ekfrid which is entirely rural has no municipal water supplies or sewage works. The municipalities of Appin and Melbourne were examined for stream pollution.

Appin

The sanitary survey of the area revealed that a number of private drains were discharging into an open drain running parallel to the south side of the railroad tracks. There was no flow at the time of this inspection, and consequently no samples were obtained.

Melbourne

Approximately two-thirds of the municipality is located in Caradoc Township, and the remainder in the Township of Ekfrid. In view of the fact that the drainage from the village discharges into a creek in Ekfrid Township, the municipality is regarded in this report as being in that area.

The main storm outlets discharge into Gentleman Creek on the "Stoner" farmland approximately one-half mile west of Melbourne and 200 yards north of Highway #2. Samples were submitted to the Commission laboratory for examination. The analyses are:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
ET 1	4.4	738	18	720	240,000

The bacteriological analysis of the sample indicated heavy contamination of Gentleman Creek.

The village has one industry, a chicken-killing plant, which is a potential source of pollution.

Melbourne Packing Company

Mr. Neil Olde, is manager of this plant, chiefly engaged in chicken-killing.

Disposal of Wastes

Water is brought from Komoka by tank truck because of the scarcity of water in the area. The amount used varies according to operations. Water from a dug well is occasionally used for washing down floors.

It was reported that three concrete settling tanks having an approximate capacity of 1350 gallons respectively were employed for the treatment of plant wastes. The effluent from the tanks is discharged into a dry well with final discharge to a storm sewer. During the time of this inspection the plant was not operating, and consequently no samples were obtained.

The method employed for the disposal of wastes at the plant is unsatisfactory.

Summary for Ekfrid Township

The southern boundary of the township borders on the Thames River. Pollution in the section of the river for the most part had disappeared. The pollution that may be detected during low flow periods comes from upstream and is carried into the township from other sources.

Some surface water drains are contaminated with sewage discharged untreated or partially treated from homes and commercial establishments in the small centres. Melbourne was an example of this condition.

An industrial waste problem exists at the Melbourne Packing Company plant, which on occasion results in the pollution of Gentleman Creek.

Recommendations for Ekfrid Township

1 - Municipal officials should carry out surveys of the storm drains in the populated centres to eliminate the connection

of all sanitary sewers to the surface drainage systems.

2 - Adequate treatment of wastes from the Melbourne Packing Company be provided before discharging to Gentleman Creek.

(7) LOBO TOWNSHIP

Municipalities and industries within the proximity of watercourses in Lobo Township were examined for water pollution.

Komoka

The township garbage dump was found to be efficiently controlled and supervised. No pollution problems were encountered in this municipality.

Poplar Hill

A chicken-killing plant owned by Mr. George Zavitz was investigated. The plant is employed in custom-killing for local patrons as desired.

Disposal of Wastes

Offal, feathers, etc. are used as fertilizer. Other wastes are discharged into a septic tank, and the liquid from this source sprayed on the garden. The plant did not present any treatment problem at the time of the investigation.

Summary for Lobo Township

Lobo Township in the Thames River watershed is the head waters of the Sydenham River, east branch. Surface water flows in a westerly direction in the north end of the township into the Sydenham River Watershed and south by the Oxbow Creek into the Thames River Watershed.

There is little evidence of pollution in these streams.

Recommendations for Lobo Township

1 - Further sanitary surveys be made from time to time of the populated areas of Lobo, Komoka, and Poplar Hill to check on stream pollution.

(8) LONDON TOWNSHIP

The Township of London has experienced tremendous growth in building construction and in population during the last five years. The population has increased from approximately 16,000 in 1952, to 34,181 in December 1957. Modern attractive homes are plentiful and form desirable sub-divisions. This growth has been influenced by the limited land available for building purposes in the City of London.

All sub-divisions were visited and drainage facilities investigated to determine the extent of pollution in the watercourses. The area depends largely on septic tanks for the disposal of domestic wastes. One sewage disposal plant is owned and operated by the township in the south-east section.

A sanitary survey of an area in the north section of the township emphasized the need for sewage works.

Drainage - The main watercourses in the area are:

1. Thames River, north branch
2. Thames River, south branch
3. Pottersburg Creek
4. Waubuno Creek
5. Stoney Creek
6. Mud Creek
7. Medway River

Stoney Creek and Medway River flow into the north branch of the Thames River. Waubuno and Pottersburg Creeks flow into the south branch. Both branches of the Thames River join to form the main branch in the vicinity of Dundas and Thames Streets in London. Mud Creek flows into the main branch west of London.

Sampling of the storm sewer outlets was carried out in the following sub-divisions:

1. Stoneybrook Meadows - Registered Plan 781
2. Stoneybrook Heights - Registered Plan 778
3. Stoneybrook Acres - Registered Plan 704

Storm sewers have been installed in these areas with an outlet at Stoney Creek. The creek flows into the north branch of the Thames River. Samples were taken at the storm sewer outfall with the results as follows:

Location	B.O.D. (ppm)	Solids Total	 Susp. (ppm)	 Diss.	Coliforms (MPN)
L. 1	3.4	362	16	346	240

Dale Sub-Division

Registered Plan 630 - This sub-division is located southwest of the Stoneybrook sub-division. Conditions were found to be satisfactory in this area.

Fifth Concession East of Highway 4 - Masonville Area

This is a low area with poor drainage facilities. Township officials reported that problems had arisen from the poor operation of private sewage disposal systems. Surface water, laundry wastes, and septic tank effluents discharge into an open drain which eventually flows into the north branch of the Thames River. There was insufficient flow in the drain to obtain samples.

McClure Sub-Division Highway 22

Registered Plan 756 - The soil in this area is of clay formation. New septic tank disposal systems were functioning properly at the present time. Construction is going on in this area, and it may be too early to forecast the effectiveness of private sewage disposal units. There are two storm drains in the area which eventually discharge into the Medway River. They are the Katharyn Drive and Taplow Road outlets. Samples were taken, the results being as follows:

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
L3 TAPLOW RD. DRAIN	1.8	254	24	230	2,400
L2 DATHRYN DR. DRAIN	3.8	294	80	214	

Beachwood Sub-Division

Registered Plan 755 - These homes are served by private sewage disposal systems. There are no drainage problems in this area.

Trudell Sub-Division

Registered Plan 589 - The private sewage disposal systems have not created any problems in the area in spite of poor drainage conditions. Storm sewers have been installed.

Medway Heights

Registered Plan 739 - Private sewage disposal systems are in use. Storm sewers are provided for surface drainage. Due to freezing weather conditions no samples were taken.

Orchard Park

Registered Plans 837 and 838 - Local Health officials do not anticipate drainage problems in this area. The soil is sandy loam, suitable for septic tank and field tile disposal systems. Surface drainage flows through storm sewers into a ravine and finally into the Medway River. There are two outlets which discharge storm drainage from Metamora Crescent and Rollingwood Circle into the ravine. Samples obtained at the two outfalls were submitted to the Commission laboratory for analysis.

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
L 4	3.2	1082	716	366	2,400 ROLLINGWOOD CIRCLE
L 5	4.6	358	98	260	2,400 METAMORA CRESCENT

University Heights

Registered Plan 766 - Septic tank problems have been investigated by township officials at Edgar Drive. Septic tank effluents and laundry wastes are permitted to enter the storm sewers and discharge into Mud Creek. The flow from this creek eventually enters the main branch of the Thames River.

Samples were taken and the results are as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 6	17	524	34	490	0

Northcrest Drive Sub-Division

Registered Plans 723 and 654 - This is a sub-division with dwellings of expensive construction. There are some private wells. There are no drainage problems anticipated here.

Oxford Park

Registered Plans 434 and 414 - This is an older district located on the western boundary of the City of London. Township officials have not experienced problems from private sewage disposal systems. However, it was reported that laundry wastes are discharged into the storm sewers which flow into Mud Creek.

Forward Avenue

Registered Plan 368 - The soil is of sand and gravel which assists materially in the operation of private sewage disposal systems.

Braemer Crescent

Registered Plan 667 - Drainage conditions are satisfactory in this area.

Oakridge Acres Sub-Division

There is a continuous development in this sub-division. It extends approximately from the Thames River to Oxford Street, the Ilderton Side Road, and to the Cameron Side Road.

Registered Plans 638, 534, 360

Private sewage disposal systems operate satisfactorily in this area. The storm sewer serving the sub-division discharges into the main branch of the Thames River in the vicinity of the Thames Valley Golf Club. There are two 8" drains discharging into the river directly south of the Golf Club. Samples were submitted for analyses with the results as follows:

LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
L 7 SUNNINGHILL AVE OUTLET GOLF CLUB	2.8	420	30	390	2,400
L 8 DRAIN #1 GOLF CLUB	3.1	306	8	298	0
L 9 DRAIN #2	2,9	406	8	398	0

Registered Plan 814

The field tile disposal systems which serve the homes in this sub-division become flooded as a result of a high water table. The soil, which is of clay formation offers poor drainage facilities. Storm sewers have been installed.

Registered Plan 818

No problems have developed from the installation of septic tank and field tile disposal systems.

Registered Plan 760

There are no drainage problems in this sub-division due to excellent soil conditions. Storm sewers have been installed to assist in surface drainage.

Registered Plan 784

Private sewage disposal systems were installed prior to the introduction of inspection in the township. Some of these systems have created nuisances probably due to improper installation. Where these cases are encountered the township officials require that correction be carried out to meet the specifications set out in the septic tank by-law.

Registered Plans 749, 810, 831

No drainage problems have been reported in these areas.

Kingsway Sub-Division

This area is serviced by private sewage disposal systems. There are a number of private wells, and these are endangered during the spring freshets.

Samples were obtained of the effluents from other storm sewer outlets in the district. There are two outlets at Warren Avenue. The effluent in the first drain was clear, while the second outlet appeared to contain laundry wastes in the flow. The results of the samples taken from the two drains are as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 10	3.2	400	10	390	2,400
L 11	232	3382	550	2832	24,000

A storm sewer outlet at Dolway Place could not be located, but it was reported to be draining into a wooded area in close proximity to the Thames River. The area was soggy, but it did not constitute a pollution problem.

The Laurel Street storm sewer on Oxford Street discharged into Mud Creek. There was a strong sewage odour detected at the outlet. Analyses of the sample obtained are as follows:

Location	B.O.D. (ppm)	Solids Total	Susp. (ppm)	Diss.	Coliforms (MPN)
L 12	4.5	400	140	260	240

Registered Plans 790 and 847

Fairmont Sub-division - This area is serviced by sanitary sewers.

Dengate Sub-division - Registered Plan 692 - No problems have been encountered here in respect to private sewage disposal systems. The area is dependent on private wells to furnish the necessary water supply. Analyses of the samples obtained were satisfactory.

Sunrise Sub-division - Registered Plan 835 - Homes in this area are serviced by sanitary sewers.

North Section of Township

A sanitary survey was carried out of the proposed sewered area to be serviced by the future North End sewage treatment plant of London Township. This area extends approximately from Adelaide Street to the north branch of the Thames River, east beyond Clarke Side Road, south to Oxford Street and west to Adelaide Street.

The survey included an investigation of drainage conditions in the populated sections. Information was provided by Township of London officials. Due to freezing weather conditions, sampling of the watercourse was limited.

Roehampton Sub-division

Registered Plan 696 - This sub-division is located on the north side of Oxford Street and east of Highbury Avenue. There are some forty medium priced homes in the area. The lots are approximately 50' by 100'. The area is flat, and the soil is of clay formation.

The homes are serviced by septic tank and field tile systems, which were installed prior to the introduction of inspection of private sewage systems. The septic tanks are made of steel and have a capacity of 200 gallons each, with 100' of field tile for each unit. Laundry wastes are discharged into open ditches in front of the buildings. Drainage problems occur during the rainy seasons. The Ontario Hospital drain, on the east side of the sub-division carries some of the surface drainage to Pottersburg Creek.

Nu-Way Sub-division

Registered Plan 796 - This area is located west of Highbury Avenue and on the north side of Oxford Street. Township officials estimate that 98 per cent of the septic tank and field tile systems have been inspected. The Township of London requires septic tanks to be made of concrete with capacity of 400 gallons. The system must also have 250' of field tile laid in crushed stone. The soil in this area is sandy, and no sanitary waste disposal problems have developed.

A storm drain was installed by the sub-divider, which drains storm water from the area into open ditches in the Merwin Heights sub-division.

Merwin Heights Sub-division

Registered Plan 490 - This is considered to be one of the oldest sections in the area. Many of the homes are of lower cost construction, and some are serviced by private wells and outside toilets. There are several open ditches draining through the sub-division. Township officials report that laundry wastes and septic tank effluents are discharged into the ditches. Residents in the area have complained of raw sewage flowing in the ditches.

The Applegrove Area

Registered Plan 799 - In the north section of Merwin Heights consists of new homes, No drainage problems have been encountered.

Septic tanks problems have occurred in the low areas receiving drainage from surrounding land. The ditches in the Merwin Heights drain to form a single watercourse in the vicinity of Victoria, McNay, and Boullie Streets. A tile (12 inch) drain, known as the Michealmas drain discharges storm water in this area. The ditch carrying the drainage from the area flows in a northerly direction and returns to Huron Street diversion and serves to drain the area before discharging into the Thames River.

Hillcrest Area

Registered Plans 613 and 728 - This is a comparatively new section. There are no storm sewers. Some septic tank troubles have been experienced during the wet weather due to poor drainage. There are some private wells in the section known as Registered Plan 613.

Malley Street-North of Huron Street

Registered Plan 806 - It was reported that laundry wastes were being discharged into storm sewers in this area. Septic tank problems have occurred due to poor drainage conditions.

The V.L.A. Sub-division

Registered Plan 582 - The sub-division is located south of Kipp's Lane. Septic tank systems were inspected by V.L.A. officials and have operated successfully it was reported.

Northbrae Area

Registered Plan 583 - Township officials have received many septic tank complaints from this area due to poor drainage conditions. Laundry wastes are permitted to discharge into open drains which flow into the Huron Street diversion.

Taylor-Victoria-Cheapside Area

Registered Plans 687 and 149 - A number of septic tanks on the west side of Taylor Street discharge into an open ditch. Drainage problems exist during the wet season.

Sampling

Samples were taken from the various watercourses for bactericlogical and sanitary chemical analyses.

LOCATION (MERWIN HGT)	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
L 13 CLEMENS ST. DRAIN OUTFALL	2.5	520	8	512	2,400
L 14 MICHEALMAS DRAIN	29	692	30	662	2,400,000
L 15 MERWIN DITCH AT ADELAIDE STREET	2.8	386	10	376	24,000,000
L 16 MERWIN DITCH AT HURON STREET	1.5	378	12	366	2,400

A drainage problem exists in the area. It was evident in the Roehampton Sub-division, where it has been necessary to discharge laundry wastes into the open ditches. The Nu-Way sub-division drains surface water and laundry wastes into the Merwin Heights area where the problem is acute. In Merwin Heights raw sewage is permitted to discharge into the watercourse. The wastes from the area flow in a northerly direction into the Huron Street diversion. Surface drainage and domestic wastes from the Northbrae and the Taylor-Cheapside-Victoria area drain into the watercourse and eventually into the Thames River.

The sanitary survey of the area emphasized the need for sewage works.

Storm Sewers

Sampling was carried out on the storm sewer outlets serving the suburban areas of London Township. The location of these outlets and the results of the analyses are listed.

		SOLIDS					
LOCATION	B.O.D. (PPM)	TOTAL	SUSP. (PPM)	DISS.	PH (PPM)	PHENOL (PPB)	COLIFORMS (MPN)
THAMES RIVER - SOUTH BRANCH							
L 17 MEADOWLILLY ROAD	4.9	412	28	384	8.0	2	240
L 18 HIGHBURY ROAD	(NO FLOW)						
L 19 INDUSTRIAL ROAD DRAIN-SOUTH WEST OUTLET	1.8	376	10	366			240
L 20 INDUSTRIAL ROAD DRAIN-NORTH WEST OUTLET	(NO FLOW)						
L 21 DAWN DRIVE	4.4	266	14	252			240
L 22 CORNERBROOK AVENUE	(NO FLOW)						
L 23 VANCOUVER & MOFFATT STS	15	476	112	364			
L 24 VANCOUVER & TRAFALGAR STREETS	10	400	118	282			2,400
L 25 KIWANIS PK. DRIVE AT BRYDGES STREET	27	544	90	454			24,000
L 26 ARCADIA CRESCENT	(NO FLOW)						
L 27 AVALON STREET	(NO FLOW)						
L 28 HERBERT AVE.	(NO FLOW)						
L 29 OXFORD ST. NEAR 3RD ST.	14	556	256	300	8.1	5	0
L 30 DUNDAS & 1ST STS.	(NO FLOW)						
L 31 " " "	" "						
L 32 TRAFALGAR, EAST OF CLARKE SIDE ROAD	4.6	284	24	260	8.0	4	240
L 33 FIRST ST. NEAR C.P.R. TRACKS	15	700	20	630			
L 34 UNIVERSITY BLVD. OUTLET N.E. SIDE OF BRIDGE	2.4	602	104	498			24
OUTLET S.E. SIDE OF BRIDGE	3.8	440	66	374			24
L 36 PARKDALE AVE.	2.3	312	44	268			24
L 37 TOWER LANE	(NO FLOW)						
L 38 HURON ST. DIVERSION	6.8	408	16	392			2,400
L 39 MT. ST. JOSEPH ACADEMY DRAIN (PRIVATE)	4.5	410	10	400			0
L 40 WILTSHIRE ROAD	(NO SAMPLE TAKEN)						
L 41 WESTERN RD. DRAIN N.W. OF BRIDGE	3.8	324	18	306			2,400
L 42 WESTERN RD. DRAIN N.E. OF BRIDGE	30	578	24	554			240
L 43 WESTERN RD. DRAIN S.E. OF BRIDGE	(NO FLOW)						
L 44 DRAIN OUTFALL AT HUNT CLUB (PRIVATE)	4.8	452	8	444			2,400
L 45 DOLWAY STREET	(NO SAMPLE)						

From the above analyses it can be readily concluded that the many storm sewers in the Township carry sanitary and industrial wastes. This results in pollution of the receiving streams.

B.O.D. figures as high as 30 p.p.m. and coliform organisms up to an M.P.N. of 24,000 were reported. In addition phenol was reported in excess of the accepted standard. All these pollutants are evidence of indiscriminate discharge to storm sewers which were intended to serve as surface water carriers only.

Sewage Works - A modern sewage system serves a section of the "built-up" area of the Township.

The program of separate sanitary and storm sewers is followed with the sanitary flow being treated at a modern activated sludge treatment plant. The treated effluent is discharged to the south branch of the Thames River.

Sewage Treatment Plant - The sewage treatment plant, of the activated sludge type has a capacity of 1.6 million gallons per day.

Flow - The figures on flow through the plant were provided from flow meter records as follows:

Average - 0.8 M.G.D.
Maximum - 1.55 M.G.D. (Occurring during rainfall)
Minimum - 0.75 M.G.D.

During the wet weather period there is an undesirable amount of infiltration and surface water drainage in the sanitary sewers. A program of supervision of surface water connections has been undertaken to correct this situation.

Operation - The operating results on this treatment plant have been entirely satisfactory and have been in line with the latest developments in sewage treatment plant design and good operation.

By-pass - A by-pass arrangement has been constructed for diverting the flow from the main trunk sewer entering the plant to the effluent sewer which has, as its outlet, the Thames River, south branch.

TABLE 9

LONDON TOWNSHIP SEWAGE TREATMENT PLANT

ONTARIO WATER RESOURCES COMMISSION ANALYSES

DATE	B.O.D.			TOTAL SOLIDS P.P.M.			SUSPENDED SOLIDS P.P.M.			DISSOLVED SOLIDS P.P.M.			PERCENT REDUCTION			
	RAW	INT.	EFFL.	RAW	INT.	EFFL.	RAW	INT.	EFFL.	RAW	INT.	EFFL.	B.O.D.	TOT. SOL.	SUSP. SOL.	DISS. SOL.
DEC. 30/56	29	156	70	650	574	666	98	38	16	552	536	650	71		84	
DEC. 31/56	190	71	40	1932	940	628	274	84	6	1658	856	622	79	67	98	63
MAY 16/57	18		15	492		654	18		36	474		618	17			
JUNE 9/57	246	153	15	912	736	736	216	168	112	696		624	94	17	48	10
JULY 23/57	160		26	912		678	348		18	564		660	84	26	95	
AUG. 13/57	218		18	1014		756	300		94	714		662	92	26	69	7
NOV. 24/57	32		4	540		568	100		40	440		528	81		60	
MAY 22/58	152		13	2074		694	1436		16	640		678	91	67	99	

NOTE: WHERE NO PERCENT REDUCTION IS INDICATED, THERE IS A GAIN RATHER THAN REDUCTION.

OWRC. SEPTEMBER 1958 J.H.

The by-pass weir is set at 2 M.G.D. and as a result diverts all flows in excess of this amount to the river.

Proposed Sewage Treatment Plants

The design of a second activated sludge sewage treatment plant has been completed, and construction is anticipated in the near future. This plant is to be located on the north branch of the Thames River at Adelaide Street. It will have an initial capacity of 1 M.G.D. with a proposed extension to 2 M.G.D. and future expansion to 4 M.G.D.

A sewered area bounded by the north branch of the Thames River on the north, Clarke Side Road on the east, Oxford Street on the south, and Adelaide Street on the west will be served by this plant.

A third sewage treatment plant is proposed to serve an area north of the Thames River west of the City of London boundary. This area is known as "Oak Ridge Acres" and includes a large section presently being sub-divided by The Sifton Development Company.

In the drainage area there are 970 acres presently under development which will be eventually sewered and some 500 acres in the proposed "Sifton" sub-division. This also includes "The Sir Adam Beck Sanatorium" which should be served by the proposed plant.

The site proposed for the west end plant is on the property of the sanatorium and will have the main branch of the Thames River as its outlet below Byron.

OTHER POPULATED AREAS IN LONDON TOWNSHIP

Broughdale

This is a suburb of London and is served by the City municipal sewerage system.

Arva

The Village of Arva has two open storm drains. One discharges into Medway Creek and the other onto farmland respectively. Local health authorities reported that connections from private premises to the storm drains had been severed. A sample of the effluent from the first drain was taken for sanitary chemical analyses. The results were as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 46	3.1	310	6	304	0
	2.3	298	8	290	1400

Birr

A Department of Highways' drain discharges south of the hamlet near the school and east of highway No. 4. The effluent flows through an open ditch to Medway Creek. It was reported that some of the homes in the area were connected to the drain. Samples were taken at the drain outlet for sanitary chemical analyses:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 47	16	2152	1580	572	0

Ilderton

This police village has one storm sewer which discharges into a tributary of the Sydenham River, east branch. The outlet is located north-west of the village on the Bloomfield farm, approximately 300 yards north of the farmhouse and 75 yards west of the railroad. Samples taken at the storm sewer outlet were submitted for sanitary chemical, and bacteriological analyses. The results are as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 48	2.9	420	12	408	24

An open drain was recently constructed to carry storm water flow east of the village. There was no flow during the time of this inspection.

Elginfield

This hamlet is located at the junction of highways 4 and 7. There is a Department of Highways' drain in the area, but there were no known private connections made to it.

Devizes

There are no drains in this area. The only source of pollution is from the local cheese factory which is dealt with in the section on industries in this report.

Bryanston

There were no pollution problems evident in this area.

Ballymote

Township officials have eliminated all private discharges to the watercourse in the hamlet.

Fanshawe

There are no known sources of pollution in the hamlet of Fanshawe.

Hyde Park

The main village drain, namely "The Stanton Drain" flows from the vicinity of the "Drive-in Theatre" in a south-westerly direction to a watercourse. The outlet is located approximately 100 yards south of Hwy. 22.

A sample was taken at the "Stanton" drain outfall. The results were as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 49 Stanton Drain	2.8	424	42	382	2,400

Samples were taken of the effluents from a Department of Highways, and a field drain in the immediate vicinity of the "Stanton" drain. The results were satisfactory as indicated below:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
L 50	4.0	490	12	478	0
L 51	1.2	328	8	320	-

Melrose

There does not appear to be any pollution problem in this area. Sanitary wastes are disposed of by means of private septic tank and field tile disposal systems.

INDUSTRIES OF LONDON TOWNSHIP

Devizes Cheese & Butter Company - R.R.#1, Denfield

Mr. D. Hunter, Plant Manager, was interviewed at this time. The plant is engaged in the manufacture of cheese and butter.

Disposal of Wastes

Water is obtained from a drilled well, and the volume used was estimated at approximately 5,000 gallons per day. Whey from the manufacture of cheese is returned to the farmers. Other manufacturing wastes are discharged to a concrete tank having an approximate capacity of 4300 gallons. The effluent from this tank is discharged into a watercourse which eventually flows into Medway Creek.

A septic tank and field tile disposal system is employed for the disposal of sanitary wastes.

Sampling

A sample of the plant wastes was procured at the plant drain outfall, the results were as follows:

B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
1400	2604	682	1922	0

Pollution of the watercourse resulted from wastes discharged from the cheese factory. This is contrary to The Ontario Water Resources Commission Act. A satisfactory method of waste disposal should be adopted.

INDUSTRIES IN OXFORD STREET EAST AREA

A number of industries are located in London Township in the Oxford Street East area. The industries occupy, in most cases recently constructed buildings, properly serviced with both storm and sanitary sewers, and no waste discharges reach the creeks or ditches. Roof and field tiles are connected to the storm sewer, and all sanitary and industrial wastes are discharged to the sanitary sewers. The industries located out of the area serviced by sanitary sewers have installed septic tank and field tile systems for sanitary wastes.

During the industrial waste survey in London Township a visit was made to each industry by the staff of the Industrial Waste Branch of the Ontario Water Resources Commission, an inspection of the plant process was made, the type of waste resulting from the process was investigated, and a discussion was held with plant management regarding the origin, characteristics, treatment and disposal of all plant wastes.

When necessary a sample of the waste effluent was collected for laboratory analysis.

The following information has been summarized from the information obtained during this industrial waste survey.

Retail Petroleum Products Distributors

Five oil companies operate retail petroleum products marketing outlets on Oxford Street in the vicinity of the Clarke Side Road in London Township. They are British American Oil Company Limited, and the Sun Oil Company Limited, Canadian Oil Companies Limited, Imperial Oil Limited, and McColl Frontenac Oil Company Limited.

The operations at each company are similar. Oil is transported to the site by pipe line or tank truck. A number of product storage tanks are used at each location and are provided with dykes for containing any oil lost by accident. The companies receiving oil by pipe line use dehydrators for removing small quantities of water from the product. Water removed by the dehydrators soaks to the ground, and any sludge is removed in trucks,

A ten-inch storm sewer on Oxford Street receives roof and land drainage from the sites. Septic tanks are used for the disposal of sanitary wastes. No liquid wastes originate from the operations at the marketing outlets.

Pipeline Pumping Station

A relay pumping station of the Sarnia Products Pipeline is operated by Imperial Oil Limited in London Township at the Clarke Side Road and Cheapside Street.

A water and oil separator used to remove water from the oil discharges the separated water to a ditch on the south boundary of the property. The water entering the ditch was observed to be clear, and no oil was seen along the banks of the ditch.

General Motors Diesel

The General Motors Diesel plant on Oxford Street in London Township employs approximately 1,000 persons. Operations include cleaning, machining, welding, assembling and spray painting. The industrial wastes from the plant are caustic cleaning solution which was trucked to a dump, oils which are collected and burned or used for dust control on traffic roads on the plant property, and water from a spray painting booth.

A sewer, called the General Motors sewer, carries all wastes, including sanitary to the London Township sanitary sewer. Storm water run-off from roof drains and field tiles goes to a creek at the rear of the property.

Canadian Westinghouse Company Limited

The Canadian Westinghouse plant on Huron Street and the Clarke Side Road in London Township employs approximately 200 persons. Operations carried out in this building are fabricating, assembling, and coil winding of distribution transformers and capacitors.

There are no liquid industrial wastes produced in these operations. All sanitary sewage is discharged to the Clarke Side Road 10-inch sanitary sewer, and all roof drains and field tiles discharge to the 33-inch Clark Side Road storm sewer.

Canada Vulcanizer and Equipment Co. Ltd.

The Canada Vulcanizer and Equipment Co. Ltd. employs approximately 80 people to produce finned heating and cooling tubes, heat exchangers, and vulcanizing equipment. The operations include soldering and welding and are strictly assembly. The plant is connected to the Clarke Side Road storm and sanitary sewers. The operations produce no liquid industrial wastes.

Wolverine Tube Division of Calument and Hecla of Canada Limited

Wolverine Tube at Clarke Side Road and Cheapside Street produces copper and brass tubing. Copper is heated in a furnace and extended, brass is cold drawn and annealed.

Oxide Removal

Oxides are removed by placing the material in five tanks in series, each approximately 4 ft. x 52 ft. x 4 ft. deep. They are called the etch tanks which contained 10-12% by volume of sulphuric acid, the fix tank which contained dichromate solution, the alkali dip tank which contained Wyandotte alkali cleaner and hot and cold rinse tanks. The tanks are dumped periodically when the chemicals are spent. The spent chemicals go to a neutralizing filter. The waste passes through limestone, and lime is added during the dump which precipitates the chrome and neutralizes the acid. The effluent from the filter pump discharges to the sanitary sewer.

Cooling Water

Uncontaminated cooling water was segregated and recycled through a cooling pond of 500,000 gallons capacity using spray nozzles. The total water consumed in the plant per day was approximately 250,000 gallons of which 90% was recycled through the cooling pond. The pH of the water in the pond was controlled between 7.2 and 7.5. Approximately 25,000 gals. per day of municipal water was required for make-up,

Coolant

A very small quantity of coolant (0.5% soda ash in water) was used on the fin cutting machine. This was wasted to the sanitary sewer and amounts to only a few gallons per day.

Minnesota Mining and Manufacturing of Canada Limited

The Minnesota Mining and Manufacturing of Canada Limited manufactures adhesives and abrasives, scotchlite reflected materials, pressure sensitive tapes, and varnished and electrical insulation material. The plant employs between 500 and 600 persons.

A private well supplies water for cooling purposes, and the municipal supply is used for process water. Storm water is drained to a creek at the rear of the property. Sanitary wastes go to the township sanitary sewer. The wastes resulting from process operations are solid in nature and are removed to a dump at the rear of the property and burned. Glue which was difficult to burn was removed to a separate dump located away from any drainage ditches or creek.

Proto Tools of Canada Limited

Proto Tools of Canada Limited employ 65 persons in the plant on Oxford Street East, London Township. They manufacture all types of mechanics' hand tools and do job plating in copper, nickel and chromium. Forged material receives nickel and chromium plate, while die-cast material receives copper and chromium plate.

A large sump 80 ft. x 30 ft. x 18 in. deep receives all liquid wastes from plating operations. Liquid flowing to the sump results from rinse water overflow, a constant flow while plating operations are in progress. The amount of municipal water consumed per day for all purposes in the plant was approximately 40,000 gallons.

Oil quenching was used for hardening. There was no loss of quenching oil in this operation and none was discharged to the sewer.

The chips resulting from machine work usually carry oil adhering to the surface. The chips are put in screen bottom drums which are placed on the top of another drum which collects the oil. The oil and chips are trucked away. There was evidence of this oil in the ditches at the rear and front of the property. The presence of oil in the ditches was said to have resulted from an accidental spill of oil drums from a truck. The spilled oil reached a ditch at the rear of the property and was carried to an open ditch along Oxford Street. There was no floating oil on the surface of the ditch water at the time of the visit, but the banks of the ditch were blackened with oil.

Imperial Plating Rock Co.

The Imperial Plating Rock, a small industry, is located on Oxford Street employing five people. The plant forms and coats with plastic, rocks used in the plating industry. The operations are dry. There are no liquid-borne industrial or sanitary wastes originating from the building. Sanitary facilities are provided at the adjacent Proto Tool Company building.

Lornehurst Dairy - R.R.#5, London

This milk processing plant, owned and operated by Mr. Gordon Wilson, is engaged in the production of pasteurized milk products.

Disposal of Wastes

Water is obtained from a drilled well. The volume used could not be determined. Wastes from cleansing and washing operations are discharged through a floor drain into a creek at the north end of the plant. This creek flows into the North branch of the Thames River. Wastes from this dairy should not be permitted to discharge untreated into any watercourse. It is recommended that a suitable septic tank and adequate field tile system be installed for the disposal of the plant wastes.

Anderson's Slaughter-house, Hyde Park

Plant Superintendent, Mr. E.T. Storer, was interviewed. The plant is employed in the slaughtering of beef cattle.

Disposal of Wastes

Water is obtained from a private well. Hides, blood, and heavier solids are sent to a fertilizer company. Wastes from cleansing operations are discharged through a settling tank and field tile system. An investigation of the area did not reveal a drain outlet or any discharge from the plant. There did not appear to be any pollution problems as a result of plant operations.

Moir's Dairy - R.R.#3, Ilderton

The dairy is owned and operated by Mr. Victor Moir. Pasteurized milk products are processed at this plant.

Disposal of Wastes

Water for use in the dairy is obtained from a private well. The volume used could not be ascertained at this time. Plant wastes are discharged through a concrete settling tank furnished with a field tile disposal system. A considerable amount of water is normally used in processing operations in a dairy plant. It will be necessary to re-visit the plant during favourable weather conditions to determine if any plant wastes are entering the watercourse.

Sun Oil Company

Messrs. L. Roberts and N. Pullen, company officials were interviewed.

There are several oil storage tanks on the property owned by the company. The writer was advised that there were no oil wastes entering storm sewers or watercourses from the premises.

Canadian Oil Company

Mr. A.J. Furness, Superintendent, was interviewed. There were no oil waste problems.

McColl Frontenac (Texaco)

Oil is stored in large tanks on the property.

Imperial Oil Company

Mr. J.S. Garner, Superintendent, informed the writer that no oil was permitted to enter storm sewers or open ditches from the area of the storage tanks.

British-American Oil Company

Mr. G.E. Garlick, Superintendent, advised that oil was stored in tanks on the property. There were no apparent waste problems.

Oil companies are required by law to have a protective wall around storage tanks. In the event a storage tank is damaged any oil discharged would be contained within the wall.

The Westinghouse Company, Canada Vulcanizer and Colument and Hecla plants are located at Huron Street and Clarke Side Road. Construction work has not yet been completed. Sanitary sewers have been provided.

Minnesota Mining and Manufacturing Company

Mr. J. Hawkin, a company engineer, was interviewed. The plant is employed in the manufacture of sand paper, abrasives, insulating products, tapes, etc.

Disposal of Wastes

Water is obtained from both municipal and private sources. The volume used could not be estimated. Wastes discharged into a watercourse consist of boiler and cooling water. Sewage wastes are discharged to a sanitary sewer.

This plant will be investigated during an industrial survey of industries in the area.

Proto Tools of Canada Limited

Mr. D. Maggiora, plant Superintendent, supplied information regarding plant wastes. Metal plating is carried out.

Disposal of Wastes

The volume of water used for plant operation was estimated at approximately 1,840,500 gallons per month.

Township officials were concerned with the quality of the wastes being discharged into the sanitary sewers. On one occasion the plant wastes were reported to have a pH range of 2.0 to 12.0. Acid wastes are treated by a process of dilution. Extreme care must be taken to ensure that wastes leaving the plant are of a quality that will not be detrimental to the efficient operation of the sewage treatment plant.

General Motors Diesel

Mr. R. Reid, Building Engineer, and Mr. K.G. McColl, Assistant Building Engineer, supplied information relevant to waste disposal.

The plant is engaged in the manufacture of diesel engines.

Disposal of Wastes

The volume of water used at the plant was estimated as approximately 2,500,000 gallons per month. Sewage wastes are discharged into sanitary sewers.

Industrial wastes from dipping tanks are taken away in a tank truck for disposal. Some oil wastes are discharged through storm sewers into property with outlets at the creek. Inspection of the storm sewer outlets showed evidence of oil in No. 1 storm sewer, but there was no flow during the time of this visit. Samples were obtained from storm sewers No. 2 and 3, (L52 & L53), No. 2 showed evidence of oil and paint in the flow. Storm sewer No. 4 had no flow. The storm sewers serve to carry drainage from buildings, parking lots, and surrounding premises.

Location	B.O.D. (ppm)	Solids			pH	Lead (ppm)	Phenol (ppb)	Cyanides (ppm)
		Total	Susp.	Diss.				
		(ppm)						
L 52	(no flow)							
L 53	36	278	8	270	7.5	4	150	0
L 54	3	3	6	220	7.8	3	25	0
L 55	(no flow)							

An effort is being made by company officials to prevent any industrial wastes from being discharged into the storm sewers. The examination of the sewer outlets indicated that pollution of Pottesburg Creek is taking place in the area of General Motors Diesel plant.

OTHER INDUSTRIES

Other industries in London Township did not have waste problems of any significance.

Beck Memorial Sanatorium

This institution can accommodate 650 patients. During the time of this inspection there were approximately 325 persons receiving treatment. There is a staff of approximately 300.

Disposal of Wastes

The method of waste disposal was reviewed with Mr. A.J. Armstrong, Chief Operating Engineer. The volume of water used was estimated at approximately 3,702,000 gallons per month. Septic tank systems are used for the disposal of sanitary wastes. Four septic tanks were in operation, each tank being 20 ft. square with a depth of 10 ft. and a capacity of 25,000 gallons.

No. 1 Tank is located at the west-end of No. 4 Driveway, and serves the "Willingdon", "Leonard", and Male Staff quarters. Sanitary wastes from the buildings are discharged through a 10-inch sewer into the tank. The effluent from the tank flows through a 10-inch tile into the field tile leading from No. 2 tank.

No. 2 Tank is located at the west-end of No. 3 Driveway, and serves the "Oakwood House" Dairy, now used as living quarters, "Crombie", "Morgan", "Pratton Buildings" and certain sections of the "Leonard" Building. The effluent from the septic tank is discharged through a 10-inch tile to the Thames River. A sample was taken at the outlet, 20 yards south-east of the incinerator for a sanitary chemical analysis. The results were as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.
L 56	84	542	34	510

No. 3 Tank is at the rear of the Glendale Cottages, and serves the Preventorium, doctors' homes, and some cottages. The effluent from the septic tank is discharged through a 6-inch tile into the river. A sample was taken for sanitary chemical analysis. The results were as follows:

Location	B.O.D. (ppm)	Solids Total	 Susp. (ppm)	 Diss.
L 57	34	456	34	422

No. 4 Tank discharges sanitary wastes from the Nurses' Residence and Riverview Cottages, and the south section of the sanatorium, through a 6-inch tile into the Thames River. The outlet is located some 25 yards north-west of the Byron Bridge. During this visit the outlet was found to be submerged.

All kitchen wastes are discharged through circular tanks, 4 ft. in diameter and 10 ft. in depth, with an approximate capacity of 785 gallons each. From these tanks the wastes discharge into the septic tanks. There is a circular tank located in the vicinity of each kitchen.

Storm water is discharged into dry wells.

Refuse Dumps

Three garbage dumps were investigated in the township. The dump near the Denfield Side Road and the 8th Concession, London Township, is the only one in operation. It is located a considerable distance from a watercourse and does not present a pollution problem.

The dumps at Oxford and Trafalgar Streets are not used. However, at Trafalgar Street, there was some indication that that seepage from the dump was entering the watercourse which discharges into Pottersburg Creek.

Summary for London Township

London Township located within the Thames River Watershed contributes to the pollution of the Thames River, main, north, and south branches.

Surveys carried out have indicated contamination of the tributaries, Medway River, Waubuno Creek, Pottersburg Creek and Mud Creek discharging into the Thames River and branches in the Township.

Bacterial results in excess of 2,400,000 coliform per 100 ml. in the two branches and in the main stream have been reported. This figure may be compared with the objective set by the Ontario Water Resources Commission for a clear stream at 2,400 M.P.N. coliform organisms per 100 ml. The upper limit for the B.O.D. (Biochemical Oxygen Demand) should be regarded as 4 p.p.m. Numerous samples show figures in excess of this.

The sewage works for the township consist of separate sanitary and storm sewers with treatment provided for the sanitary flow at the East End London Township Plant. The operating results of this modern sewage treatment plant have been entirely satisfactory and in line with the latest developments in sewage treatment plant design and good operation.

Plans have been completed on the design and construction of a second sewage treatment plant to be located on the north branch of the Thames River in the vicinity of Adelaide Street. It will serve the north end of the built-up area of the township immediately above the city boundary. A third treatment plant is in the planning stage. This will serve the west section of the built-up area in the vicinity of Oakridge Acres.

For the most part, the populated acres in the township have individual sewage systems serving each residence. These units consist of septic tank and field tile systems installed under the supervision of the township health authorities.

The Thames River and branches are polluted by the contaminated flow in the several tributaries caused by many surface water drains, storm sewers and private drain outlets discharging sanitary and industrial wastes to the main streams. The river is polluted beyond its ability to purify readily by natural processes. The resulting condition creates a nuisance which is intensified during the summer months when the flow in the river is lowest, and there is not enough water to dilute the effluents effectively. As increased use is made of water from the Thames the need for closer supervision and treatment will grow, and a closer control of all waste discharges, surface, industrial, and plant treatment effluents will be necessary. The situation can only be remedied by action of municipalities, industry and others to provide adequate treatment of wastes, and adequate dilution during the dry weather periods.

Recommendations for London Township

1 - The second and third sewage treatment plants proposed to serve the north-end and west-end populated areas of the township be constructed at the earliest date.

2 - A planned program of industrial waste supervision be implemented including a sewer by-law controlling the wastes discharged to sewers and correction of all waste discharges direct to watercourses.

3 - Strict control of the septic tank regulations enforced in the township be maintained, and the elimination of all

sanitary waste discharges from private dwellings, which include laundry wastes, that are polluting surface drains.

(9) McGILLIVRAY TOWNSHIP

McGillivray Township, located in the extreme north-east corner of the county is in the Ausable Watershed. It is entirely rural, with water obtained for domestic use from private wells. The treatment of sewage is by septic tank and field tile systems located on farms and commercial properties.

A sanitary survey of the township revealed only one potential source of pollution, a refuse dump.

Refuse Dump

The McGillivray township refuse dump is located between the municipalities of Lieury and west McGillivray on the bank of Parkhill Creek. It was noted that some refuse had been dumped on the bank of the creek. Care should be taken to avoid this practice. No dumping should be permitted within a reasonable distance of the stream.

Summary for McGillivray Township

The Ausable River and tributaries in the township are relatively free from pollution. However, during dry weather flow some contaminated water may be carried into the township from the villages of Ailsa Craig and Parkhill.

Recommendations for McGillivray Township

1 - Proper supervision of the township refuse dump be exercised, with precautionery measures taken to prevent drainage from the dump discharging into the watercourse.

(10) METCALFE TOWNSHIP

The drainage in Metcalfe Township is within the Sydenham

River, east branch, Watershed. The township is entirely rural.

Water obtained from private wells supply the farm buildings and commercial establishments.

The east branch of the Sydenham River receives pollution from the Town of Strathroy outside the township. This contamination is carried in the river through the township, particularly during periods of low flow.

The natural processes of recovery in the stream are at work in the township, but pollution changes the characteristics of the river and limits its use for recreation, farm watering, and other rural purposes.

(11) MOSA TOWNSHIP

The Township of Mosa is primarily rural with some small concentrations in the villages of Newbury and Wardsville.

Water pollution is reported under the section for each village.

The remaining areas in the township have individual wells and septic tank systems serving the farms and commercial establishments.

Mosa Township is within the Thames River and Sydenham River, east branch, Watersheds. Pollution of the drains, creeks and streams originates in the village of Newbury and Wardsville and affects both rivers in the localities of these municipalities. The extent of the pollution has been investigated and tabulated in other sections of this report.

(12) NISSOURI WEST TOWNSHIP

The Township of Nissouri West has two main population centres, the industrial area adjacent to London Township and the Police Village of Thorndale. The remainder of the township is rural. However, the Somerville Limited firm, the Department of Transport Buildings and the Royal Canadian Air Force establishment provide an area of development.

The Police Village of Thorndale and the hamlet of Wyton were investigated for pollution conditions.

Thorndale - Police Village

Drainage

Effluents from drains and storm sewers discharging wastes into Wye Creek, were investigated and samples obtained. Further samples were taken at various points on Wye Creek in the Thorndale area. The analyses were reported as follows:-

LOCATION	B.O.D. (PPM)	SOLIDS			COLIFORMS (MPN)
		TOTAL	SUSP. (PPM)	DISS.	
WYE CREEK - 1 MI. N.E. OF VILLAGE	4.4	274	16	258	-----
TL 3 STORM OUTFALL AT RAILROAD	103	706	124	582	24,000,000+
WYE CREEK - WEST OF CHEESE FACTORY	1.3	262	22	240	2,400
TL 5 CHEESE FACTORY DRAIN	41	472	44	428	24,000
TL 4 DRAIN BELOW CHEESE FACTORY	4.3	544	30	514	2,400
TL 2 STORM SEWER N.E. SIDE OF BRIDGE AT WEST ENTRANCE TO VILLAGE	33	562	58	504	2,400
WYE CREEK - 100 YARDS BELOW BRIDGE	1.7	242	8	234	
TL 1 STORM SEWER - SOUTH EAST OF STATION	3.8	510	14	496	24,000

Village officials reported that all known private connections from individual premises to the storm sewers had been discontinued. However, the analytical results on the samples taken throughout the village indicate that pollution of Wye Creek is still taking place. Every effort should be made to eliminate the remaining illegal connections from premises to the village storm sewers and to Wye Creek.

INDUSTRIES IN NISSOURI WEST

Thorndale Cheese Factory

The activities of this plant are confined to the manufacture of cheese. Mr. Max Archer, the Manager, was interviewed at this time.

Disposal of Wastes

A private well furnishes the water required for processing operations. The volume used was estimated at approximately 3,000 gallons per day.

Whey is taken to a gravel pit for final disposal. Wastes from cleansing operations are discharged to a septic tank and field tile distribution system.

During an investigation of Wye Creek in the vicinity of Thorndale Cheese Factory a field tile was observed discharging an effluent into the stream. Odours were evident. The tile in all probability, was a continuation of the plant septic tank system. A sample of the effluent was procured and forwarded to the Commission's laboratory for analysis with the following results:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
TL 5	41	472	44	428	24,000

All direct drainage connections to the watercourse should be discontinued with the exception of cooling and boiler waste water respectively. Further, future investigation of the tile outlet to the creek should be made and the necessary corrections carried out to eliminate this deficiency in the present system.

Somerville Limited

The company fabricates and prints various kinds of cartons, set-up boxes, special wound tubes and point-of-date displays.

The main industrial wastes discharged in this plant's storm sewer are those resulting from the lithographing process. Small amounts of lithographing chemicals could reach the stream from here. Other wastes are from the refrigeration units, compressor cooling water, and water overflow from the high gloss machine. It is not likely that the wastes from these processes would be of sufficient volume or toxicity to have any adverse effect on the receiving stream.

Sewage Works

A system of sewers and septic tanks followed by a trickling filter secondary treatment serves the Somerville plant. The system was originally designed for a capacity of 3,300 persons. The present population varies from 500 to 700. The effluent from the treatment system is discharged to Pottersburg Creek. A sample obtained from the effluent sewer with the analyses reported as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.
TL 6	23	346	14	332

These results indicate a higher B.O.D. than is desirable. This will cause some contamination of Pottersburg Creek below the outfall from the works.

Department of Transport's Sewage Works

A small sewage treatment plant serves the Department of Transport and the Royal Canadian Air Force establishment in the township. The system was designed to treat a sewage flow from a population of 5,000. This is a high rate trickling filter and clarigestor. The effluent from the treatment plant is chlorinated before being discharged to Pottersburg Creek. Raw and effluent samples obtained from the plant were reported as follows:

Location	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	
TL 7	118	440	58	382	Raw
	7	354	14	340	Effluent

The sewage treatment plant was found to be operating satisfactorily. Sample results indicated a good effluent following treatment. However, the condition of Pottersburg Creek below the Department of Transport's outfall sewer had been previously contaminated by the Somerville plant effluent upstream. As a result the pollution level increases with the Department of Transport's discharge.

Operations of the Towland Construction Company of Second Street, London, were investigated at Wyton. Two separate operations were formerly carried out in the area near Wye Creek.

1 - Waterous Plant - Gravel washing operations were formerly carried on at this plant. Company officials were not certain as to whether operations would be carried on this year.

2 - Cedar Rapids Plant - This is an asphalt plant. It was reported that operations were to cease almost immediately. A considerable amount of dust was given off during operations which covered Wye Creek with a film. The bottom of the stream was black on being disturbed. Boiler water was being discharged from the plant to the stream.

If gravel washing operations are to be continued, samples should be taken at that time.

SUMMARY FOR NISSOURI WEST TOWNSHIP

Pollution of the watercourses in the Township of West Nissouri is confined to Pottersburg and Wye Creeks, both of which are polluted, with the more serious aspect being the effect in the Fanshawe Reservoir.

The Fanshawe Reservoir is being used as a source of domestic water to replenish wells of the City of London in that area. It is important that pollution entering the reservoir be eliminated. Steps have been taken by municipal officials in Thorndale to obtain this result.

Little progress has been made by municipal officials in eliminating the contamination of surface water drains in the municipality. If the method being followed by ordering the disconnection of private sewer outlets to surface water drains and the installation of septic tank and field tile disposal systems cannot be made effective, then consideration should be given to municipal sewage works.

RECOMMENDATIONS FOR NISSOURI WEST TOWNSHIP

1 - A renewed effort be made by the municipality of Thorndale to eliminate all pollution of Wye Creek, resulting from sanitary wastes being discharged into the village storm water drainage system.

2 - The operation of the Somerville sewage treatment plant be improved to provide effluent results to meet Commission standards on stream sanitation.

(13) WESTMINSTER TOWNSHIP

There has been a steady increase in the population of

Westminster Township in the last few years. The population is approximately 22,000 at the present time. Subdivisions and industries have sprung up in areas south of the City of London.

The areas investigated in the township in this survey were the populated sections south and south-west of London and the Villages of Lambeth and Byron.

Areas South of London

The homes and industries on the outskirts of London are almost entirely serviced by municipal sewers. The D.V.A. subdivision on the east and west of Wellington Road, and south of Westminster Hospital, is served by private sewage disposal systems. It was reported that septic tank effluents discharge into open storm drains in some cases. This was found to be true at Bradley Avenue where domestic wastes were entering a storm drain into a watercourse which eventually flows into Dingman Creek. Samples of the effluent were submitted to the Commission's laboratory for sanitary chemical analyses. The results were as follows:

Sampling Point	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
W.1	22	578	94	484	24,000,000+

These results are indicative of gross pollution.

A survey of the area south of London revealed the presence of several watercourses and open drains extending into the city. Some of these discharge into city storm sewers, and others drain into the area known as the "Coves" and the Thames River. The watercourses were sampled at various points south of the boundary of the City of London. Locations of sampling points and the results of the respective samples taken are listed herewith:

SAMPLING POINT	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SUSP. (PPM)	DISS.	COLIFORMS (MPN)
W. 2	COMMISSIONERS ROAD AND MOUNT VERNON	2.4	352	50	302	240
W. 3	COMMISSIONERS ROAD AT WORTLEY ROAD	6.8	508	178	330	240
W. 4	COMMISSIONERS ROAD NEAR MURRAY STREET	2.8	522	192	330	24,000
W. 5	COMMISSIONERS ROAD 200 YDS. WEST OF GOLF CLUB	120	752	124	628	24,000,000+
W. 6	COMMISSIONERS ROAD NEAR WINERY	2.4	466	102	364	240,000
W. 7	LANGARTH STREET - DRAIN OUTFALL	6	548	10	538	2,400,000
W. 8	LANGARTH STREET - CREEK	4.7	308	16	292	24
W. 9	COVE AT FLOOD GATE	14	534	204	330	24,000
W. 10	FOREST HILL AVENUE - STORM OUTFALL	17	708	60	648	240,000
W. 11	GREENWOOD AVENUE - STORM OUTFALL	14	724	160	564	24,000
W. 12	RIDGEWOOD CRESCENT - STORM OUTFALL	2.6	332	26	358	--
W. 13	CREEK FROM TOWNSHIP AT WEST END S.T.P.	6.4	546	90	456	--
W. 14	DITCH END OF MARY STREET SPRINGBANK DRIVE	4.6	458	42	416	24
W. 15	CREEK AT JARVIS STREET SPRINGBANK DRIVE	1.4	323	6	322	2,400

These analyses indicate that pollution existed in these township watercourses. Sewage odours were evident at certain points.

The smaller communities of Glanworth, White Oak, Glendale, Scottsville, and Wilton Grove, were investigated for the presence of water pollution. These areas were found to be relatively free of pollution with the exception of Glendale where it was found that wastes were being discharged from Hook's Restaurant into a tributary of Dingman's Creek.

Samples were taken at the creek in the vicinity of the tile draining from the restaurant. The analytical results are as follows:

Sampling Point	B.O.D. (ppm)	Solids Total	Solids Susp. (ppm)	Solids Diss.	Coliforms (MPN)
W. 16	21	624	34	590	240,000

These results are unsatisfactory.

Samples were also obtained at Dingman Creek in White Oak and at Glanworth. The results are as follows:

SAMPLING POINT	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS DISS. (PPM)	SOLIDS SUSP.	COLIFORMS (MPN)
W. 17	GLANWORTH DRAIN OUTLET WEST OF VILLAGE	6.2	1196	760	436	24,000
						MEMBRANE FILTER COLIFORM COUNT PER 100 ML
	DINGMAN CREEK AT WHITE OAK	20	424	360	64	52,000

Byron

The storm flow in the village is directed mainly to an open drain which discharges into the Thames River approximately 25 yards below Byron bridge (W.25). At the time of this visit there was no flow in the drain. Other open drains were also dry.

Gravel Washing Operations

A gravel washing operation on the Kais side-road, approximately two miles north-west of the village was investigated, but operations had not commenced at this time. Wash water will be directed into a settling pond before being discharged into the Thames River. It will be necessary to obtain samples of the effluent from the washing operations to determine quality. A further check will be made.

Lambeth Police Village

In a survey carried out of the storm sewer outlets in the Police Village of Lambeth, samples were obtained at the outlets. Analytical results, and the location of the outlets are listed herewith:

SAMPLING POINTS	LOCATION	B.O.D. (PPM)	SOLIDS TOTAL	SOLIDS SUSP. (PPM)	SOLIDS DISS.	COLIFORMS (MPN)
W. 18	MUNICIPAL STORM SEWER 20 YDS. BELOW BRIDGE HWY.#2	1.2	574	10	564	24
W. 19	DITCH NEAR MUNICIPAL SEWER - WEST END OF VILLAGE	4.2	1414	968	446	24
W. 20	EAST OF VILLAGE - STORM OUTLET	3.1	622	170	452	240,000
W. 21	CREEK - EAST END OF VILLAGE	3.9	466	14	452	10,000

Strong sewage odours were detected at the storm sewer outlets. There are three Department of Highways' drains at the bridge over Dingman Creek on Highway #2, but these did not carry flows during this investigation (W.22,W.23,W.24).

INDUSTRIES IN WESTMINSTER TOWNSHIP

Certain industries in the rural areas were investigated for possible pollution problems. These are as follows:

1 - A piggery east of Wellington Road and near the Dearness Home for Senior Citizens.

2 - Storage facilities for dead and diseased animals owned and operated by the Darling Company of Chatham.

3 - Slaughterhouse owned and operated by Mr. H. Cornell, R.R.#1, Byron.

4 - Slaughterhouse operated by Mr. C. Ardy, Base Line Road, London.

Wastes from these plants did not constitute pollution problems at this time.

Refuse Dumps

The township refuse dump at Byron is a considerable distance from a watercourse and does not constitute a pollution problem.

Other investigations did not reveal further sources of pollution.

SUMMARY FOR WESTMINSTER TOWNSHIP

Westminster Township located within the Thames River watershed contributes to the pollution of the Thames River, main and south branches.

Investigations of stream pollution in the township have shown that many storm sewers, surface water drains and creeks are contaminated with sanitary wastes which result in pollution of the Thames River, main and south branches.

There are no public sewage works in the township, but plans are being formulated to provide treatment for the Police Village of Byron and an industrial area development in the vicinity of Wellington Street and 401 Highway.

Sewage disposal at present is by means of private septic tank and field tile systems supervised by the township health officials. As is the case in similar built-up areas served with septic tank systems the discharge of sanitary wastes is not entirely controlled. This condition results in contaminated surface water reaching drainage courses with pollution of the main streams.

The standard for clean streams of 2,400 M.P.N. coliform bacteria per 100 ml. and 4 p.p.m. B.O.D. (Biochemical Oxygen Demand) is exceeded in the watershed of the Thames River. This condition produces changes in the characteristics of the creeks and river restricting their usefulness for recreational and general water use. The problem is intensified during the summer months and in minimum flow periods.

Pollution created in the streams of the urbanized areas of the township requires supervision from all agencies and the municipality. If these streams are to be returned to and maintained in their natural clean state, the discharge of all effluents must be controlled. Adequate sewage works programs should be implemented.

An investigation of the "Coves" area, which is bordered by Westminster Township on one side and London on the other has indicated that sanitary wastes are being discharged from both municipalities. The London sewer outlets can be corrected by the provision of a sewage pumping station which will provide for disposal at the West End Sewage Treatment Plant, However, in the instance of Westminster Township areas, private septic tank and field tile systems will be required.

RECOMMENDATIONS FOR WESTMINSTER TOWNSHIP

1 - Sewage works be initiated for the Police Village of Byron and an industrial area development in the vicinity of Wellington Street and the 401 Highway.

2 - Adequate control of sanitary waste discharges be implemented by strict enforcement of requirements for septic tank and field tile systems in the sewered areas. Particular reference is made to the built-up areas of Lambeth and the part of the township bordering south London.

(14) WILLIAMS EAST TOWNSHIP

The Township of Williams East is within the Ausable River Watershed. A sanitary survey of the area failed to reveal any pollution conditions.

Private wells supply the population of the township with water.

Sewage treatment is provided by septic tank and field tile systems. These serve residential and commercial buildings. Pollution of township watercourses is confined to the area of the Parkhill Creek at Parkhill. This was discussed in detail in the section of the report dealing with the Village of Parkhill.

An extensive survey of the township did not reveal further pollution.

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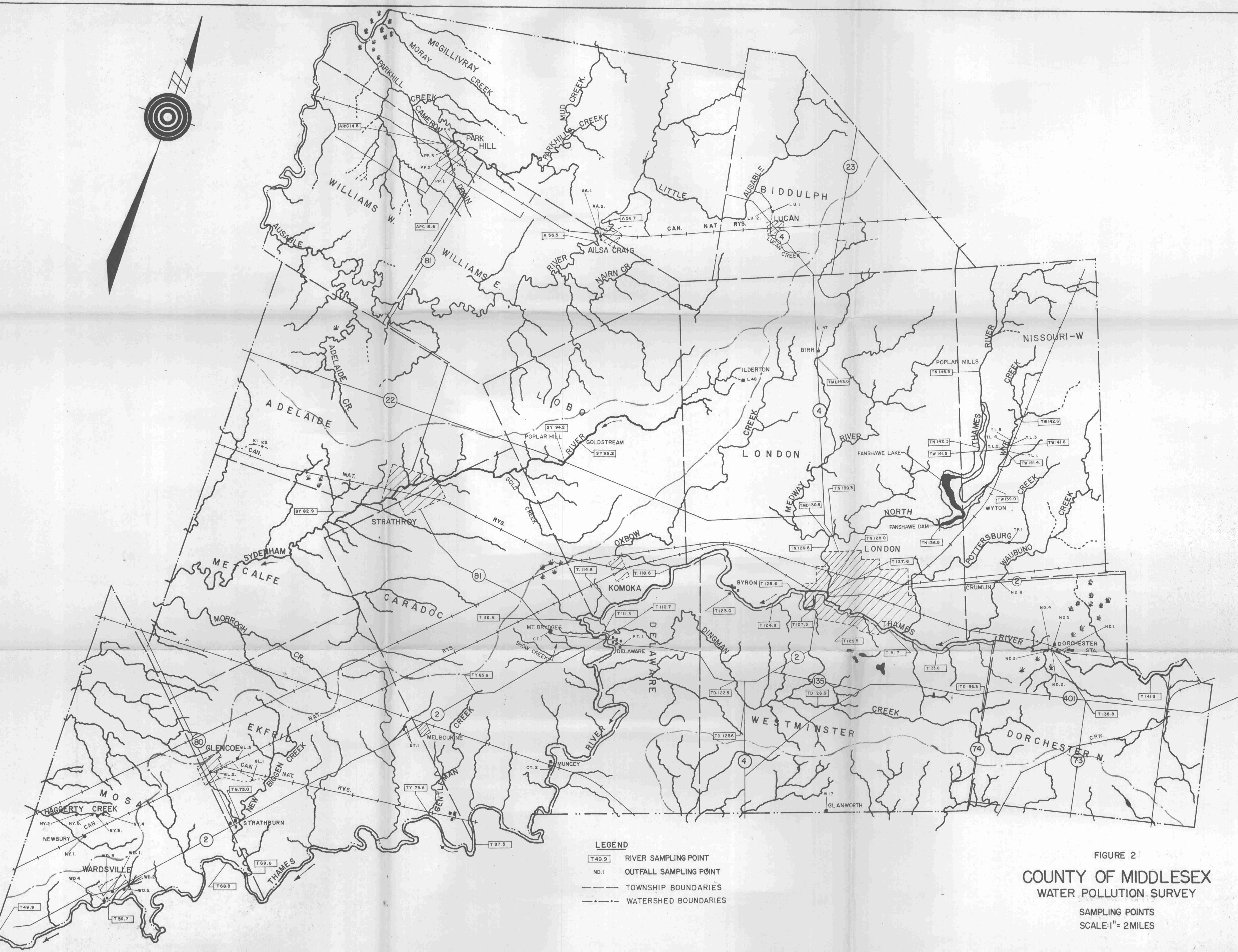

FIGURE 2

COUNTY OF MIDDLESEX
WATER POLLUTION SURVEY

SAMPLING POINTS

SCALE: 1" = 2 MILES

O.W.R.C. JULY 1958 BY H.E.

FIGURE 3

CITY OF LONDON
AND ADJOINING TOWNSHIPS

STORM SEWER OUTLETS

O.W.R.C. TORONTO JULY 1958 S.H.